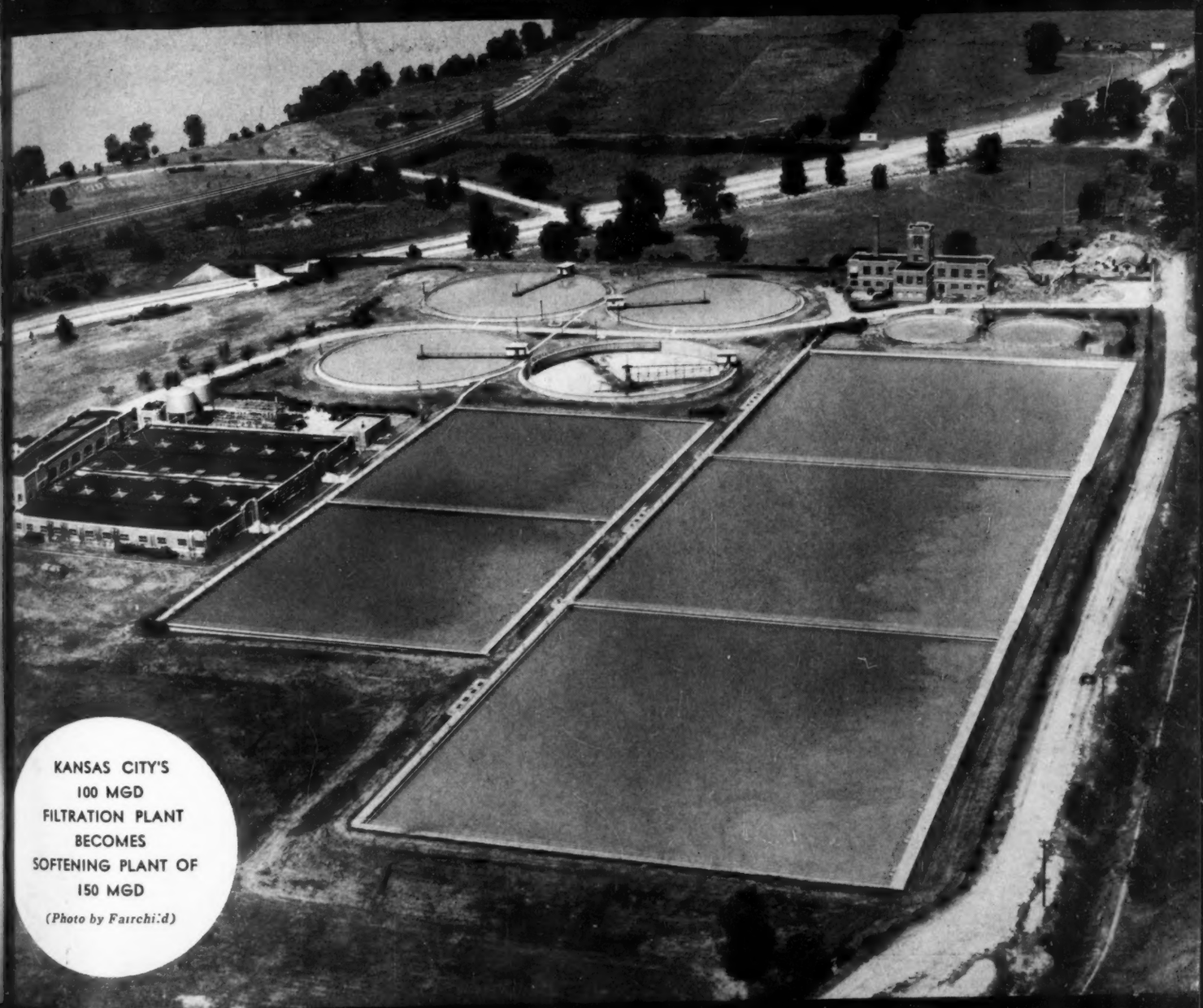
WATER WORKS & SEWERAGE

ABP ABC



KANSAS CITY'S
100 MGD
FILTRATION PLANT
BECOMES
SOFTENING PLANT OF
150 MGD

(Photo by Fairchild)

URGENT! IMPORTANT!
Return empty chlorine cylinders promptly
Chlorine production for WAR and PUBLIC HEALTH needs is hampered by idle, unreturned cylinders. Our supply of new cylinders is limited—help us make full use of those we have. Return empty cylinders without delay!

MUTE METAL WAS MADE TO SPEAK . . . . . ALMOST BY ACCIDENT

The alertness of Alexander Graham Bell, a teacher of human mutes, was vital to his discovery of how to make mute metal speak. Experimenting with a harmonic telegraph, he stumbled on the principle of the telephone, was quick to realize its value and to make long-distance speech a reality.

Alertness is important in our business, too. Whether developing a new chemical . . . or improving an existing product . . . or "trouble-shooting" in a customer's plant . . . our men show an alertness that adds new vigor to the solid reputation for integrity in chemical manufacturing which we have earned throughout American industry during the years since 1850.

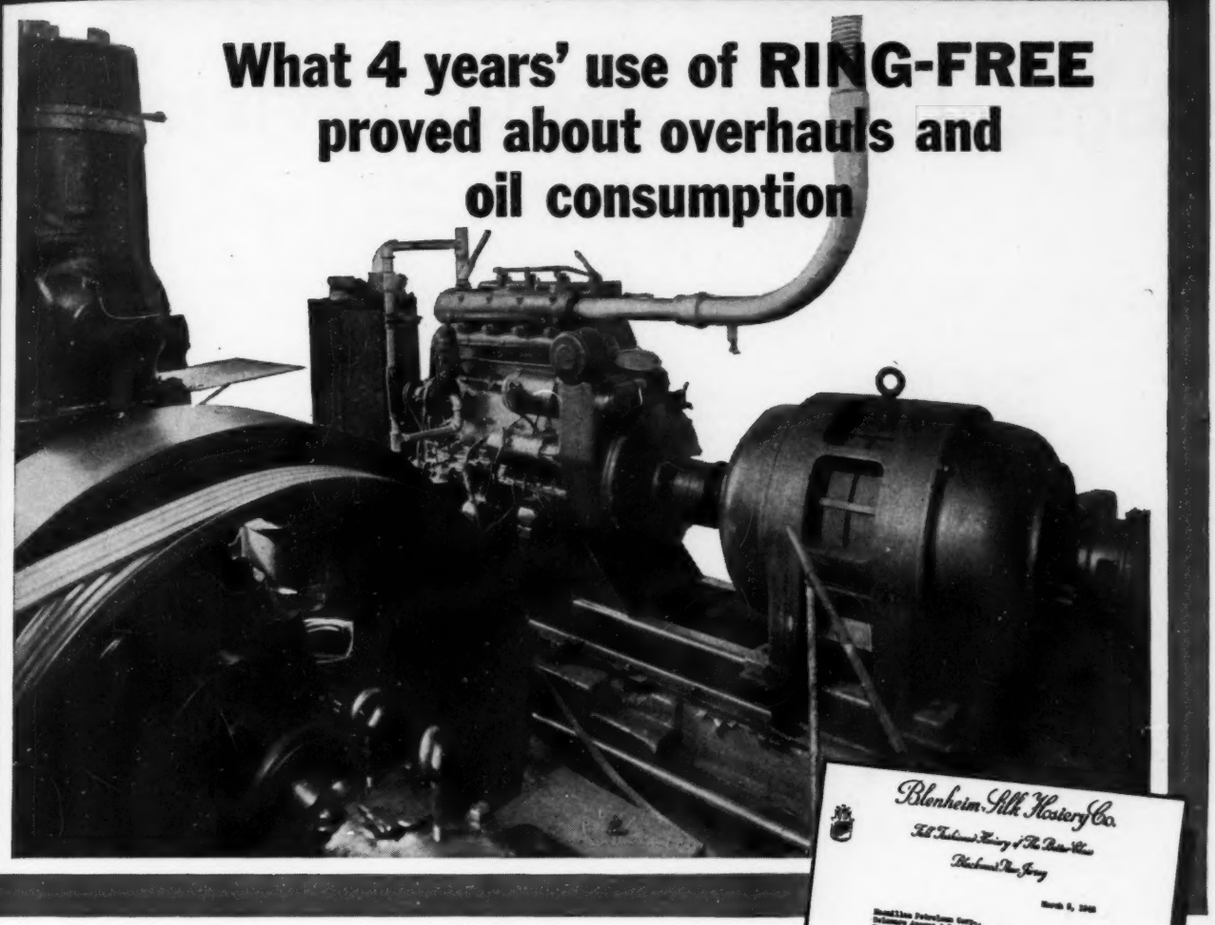
CHEMISTRY
IS THE KEYSTONE
OF INDUSTRY

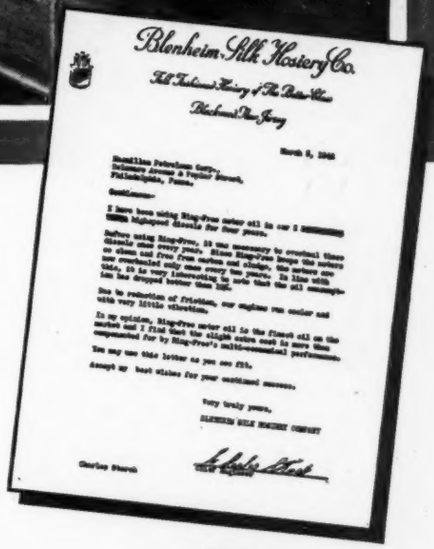
PENNSYLVANIA SALT
MANUFACTURING COMPANY
1850 *Chemicals* 1942

1000 WIDENER BUILDING, PHILADELPHIA

BRANCH OFFICES: NEW YORK • CHICAGO • ST. LOUIS • PITTSBURGH • WYANDOTTE • TACOMA
PLANTS: PHILADELPHIA • EASTON • NATRONA • WYANDOTTE • TACOMA • PORTLAND, ORE.

What 4 years' use of RING-FREE proved about overhauls and oil consumption




Blenheim Silk Hosiery Co.

SUPPOSE you were sitting across the desk from Chief Engineer Charles Storch of the Blenheim Silk Hosiery Company of Blackwood, New Jersey. Suppose you asked him:

"How long have you used RING-FREE?"

"Four years," he would tell you.

"Before you used RING-FREE, how often was it necessary to overhaul your diesels?", you might ask.

"Once every year."

"How often now—with RING-FREE?"

"Since RING-FREE keeps the motors so clean and free from carbon," he would answer, "the motors are now overhauled only once every two years."

"Any difference in oil consumption?"

"Oil consumption has dropped better than 10%," is his answer.

"Notice anything else?"

"Due to reduction of friction, our engines run cooler and with very little vibration."

"Is RING-FREE worth what it costs?"

"In my opinion, RING-FREE is the finest oil on the market and I find that the slight extra cost is more than compensated for by RING-FREE'S multi-economical performance."

Every single statement of Mr. Storch quoted above is taken from a letter by him dated March 5, 1942—ending with:

"You may use this letter as you see fit."

Whole-hearted testimonies of this kind pour into our offices from all parts of the country continually. What RING-FREE is doing for others, it can do for you. Write us!

MACMILLAN PETROLEUM CORPORATION

50 West 50th St., New York • 624 South Michigan Ave., Chicago

530 West 6th Street, Los Angeles

MACMILLAN RING-FREE MOTOR OIL

Copyright 1942 by Macmillan Petroleum Corporation

WATER WORKS & SEWERAGE, May, 1942. Volume 89. Number 5. Published monthly by Gillette Publishing Co., 330 South Wells Street Chicago, Ill. Per copy, 25c. Subscription rate, United States $2.00 per year; Canada, $2.00 per year; Foreign $3.00 per year. Entered as Second Class Matter, June 2, 1931 at the Post Office at Chicago, Ill., under Act of March 3, 1879.

How 13,000,000-gallon "Turbidimeters" show coagulation at annual savings of 20¢ to

BY CLARENCE BOHLMAN,
Water Purification Supervisor,
Cincinnati Filtration Plant

This is the story of the kind of "laboratory" test every waterworks engineer has dreamed about. In two parallel and absolutely identical settling basins two different coagulants were tested simultaneously on exactly the same type of water. The only variable was the coagulants themselves... Mr. Bohlman, who conducted the tests, started his career as a chemist when the Cincinnati Filtration plant first started in operation in 1907. Except for five years as Chief Chemist and Bacteriologist of the Cincinnati Board of Health, he has continued to serve the city's Water Department ever since. A past president of both the Ohio Conference on Water Purification and of the Cincinnati Section, American Chemical Society, he has also been very active in the American Water Works Association . . . For full details on Ferrisul and experienced technical advice on adapting it to *your* needs, inquire: MONSANTO CHEMICAL COMPANY, Merrimac Division, Everett Station, Boston, Massachusetts.

ALMOST the day the new, modernized Cincinnati Filtration Plant went into operation, difficulties started with the ferrous sulfate, or copperas, which had long been used as a coagulant.

In the old plant, the copperas was stored in duck bags. When it hardened in storage, it was broken up with mauls into lumps which dissolved easily in the solution tanks.

But in the new plant, overhead bins were provided for bulk storage and the chemical was fed into solution from dry feeders. When the copperas hardened in the bins, it was difficult and costly to break up and impossible to feed uniformly.

Specifications were changed to call for an overdried product testing not less than 105% in terms of $FeSO_4.7H_2O$, but this was only slightly less troublesome.

It was obvious that the physical properties of ferrous sulfate made its use prohibitive when stored in bins and fed from dry feeders in a modernized plant.

Search Started for Another Coagulant

Alum was studied first in a series of plant tests, but with our water, it is necessary to use lime at some point in the process to maintain about pH 8.2 in the filtered water, and when alum and lime were added at the hydraulic jump the results were unsatisfactory from many standpoints.

Finally, we decided to investigate ferric sulfate. Laboratory tests indicated we were on the right track and arrangements were made for plant scale trials, using Ferrisul, which consists of 90% anhydrous ferric sulfate.

In one of two parallel, absolutely identical settling basins, the usual copperas and lime treatment was used; in the other, Ferrisul and lime. In this way, it was possible to eliminate all variables as completely as though we were running laboratory jar tests. Ladder rungs and submerged steel structures made it possible to use the basins as gigantic turbidimeters which revealed the comparative clarity of the two waters much more decisively than laboratory turbidity determinations.

What the Giant Turbidimeters Revealed

Comparative tests were run for 22 days in February and 29 days in August.

The results were immediately obvious to anyone observing the two basins.

Slight smokiness and rusty discoloration of the copperas-lime treated water, practically imperceptible in laboratory jar tests, was present to such a degree that the fifth ladder rung in the copperas basin was only seldom visible.

The Ferrisul-lime treated water, on the other hand, was of pleasing blue color, free from rusty hue—and even with the minimum dose, the seventh or eighth ladder rungs were visible, while at optimum doses on bright days the transite piping eleven feet below the water line was visible.

Our tests further showed that optimum doses of Ferrisul saved us 43 cents per million gallons of water treated over the cost of copperas treatment, and minimum doses showed a saving of 65 cents.

Still Further Savings Found Possible

The higher pH values required for copperas are not necessary with Ferrisul so that we were able to reduce the values shown in the table in subsequent experiments with consequent savings in lime doses.

After treating the entire plant output for 15 days with Ferrisul-lime, the filter influent was so clear that the lengths of filter washes were reduced with a saving of about 25% of our wash water.

All analytical results on the filter effluent were entirely satisfactory. Dissolved iron ranged from zero to 0.01 ppm. or about the same as with copperas. A pH value of about 8.2, or slightly above, was easily maintained. There was no appreciable reduction in dissolved oxygen as compared with 10-15% reductions when using the ferrous coagulant.

What About Our Storage Troubles?

First of all, Ferrisul proved very easy to handle by pneumatic unloading equipment and the quantity unloaded per hour was materially greater than for lime, alum or copperas.

Nine weeks after one of the bins had been filled to a depth of about 11 feet with four carloads, or 120 tons of Ferrisul, the first withdrawal was made—and the Ferrisul fed perfectly and evenly from the bin. The bin emptied itself completely with no caking whatsoever.

Obviously Cincinnati water hereafter will be treated with ferric sulfate.

At present delivered prices for Ferrisul and lime a conservative estimate of annual savings will be from 20-30 cents per million gallons.

FERRISUL for better, more efficient so

showed Cincinnati plant way to better

to 30¢ per million gallons treated!

	OPTIMUM FERRISUL DOSE		MINIMUM FERRISUL DOSE	
	Copperas Basin	Ferrisul Basin	Copperas Basin	Ferrisul Basin
UNTREATED WATER				
Temperature	37 F		37 F	
Turbidity	45		43	
Total alkalinity	30		29	
pH	7.1		7.1	
DOSES, GPG.				
Lime	0.83	0.83	0.83	0.83
Coagulant	1.25	0.75	1.25	0.63
Fe	0.25	0.188	0.25	0.158
BASIN EFFLUENT				
Turbidity	5	4	5	4
Phth. alkalinity	8	11	9	14
Total alkalinity	39	41	38	43
pH	8.7	8.8	8.7	8.9
COST PER MILLION GALS.				
Lime	$0.43	$0.43	$0.43	$0.43
Coagulant	1.78	1.35	1.78	1.13
Total	2.21	1.78	2.21	1.56
SAVING PER MILLION GALS.		$0.43		$0.65

OPTIMUM DOSE: that which gave equally as good coagulation and clarification as the next higher dose and better clarification than the next lower dose which is designated as the *minimum* dose.

RESULTS

Copperas basin: Slight smokiness and rust discoloration easily discernible. Fifth ladder rung in basin only seldom visible.

Minimum Ferrisul dose: Water a pleasing blue, free from rusty hue. Seventh or eighth ladder rung always visible.

Maximum Ferrisul dose: Water blue, free from rusty hue. On bright days transite piping—eleven feet below water line clearly visible.

sewage and water treatment

MONSANTO CHEMICALS

SERVING INDUSTRY...WHICH SERVES MANKIND

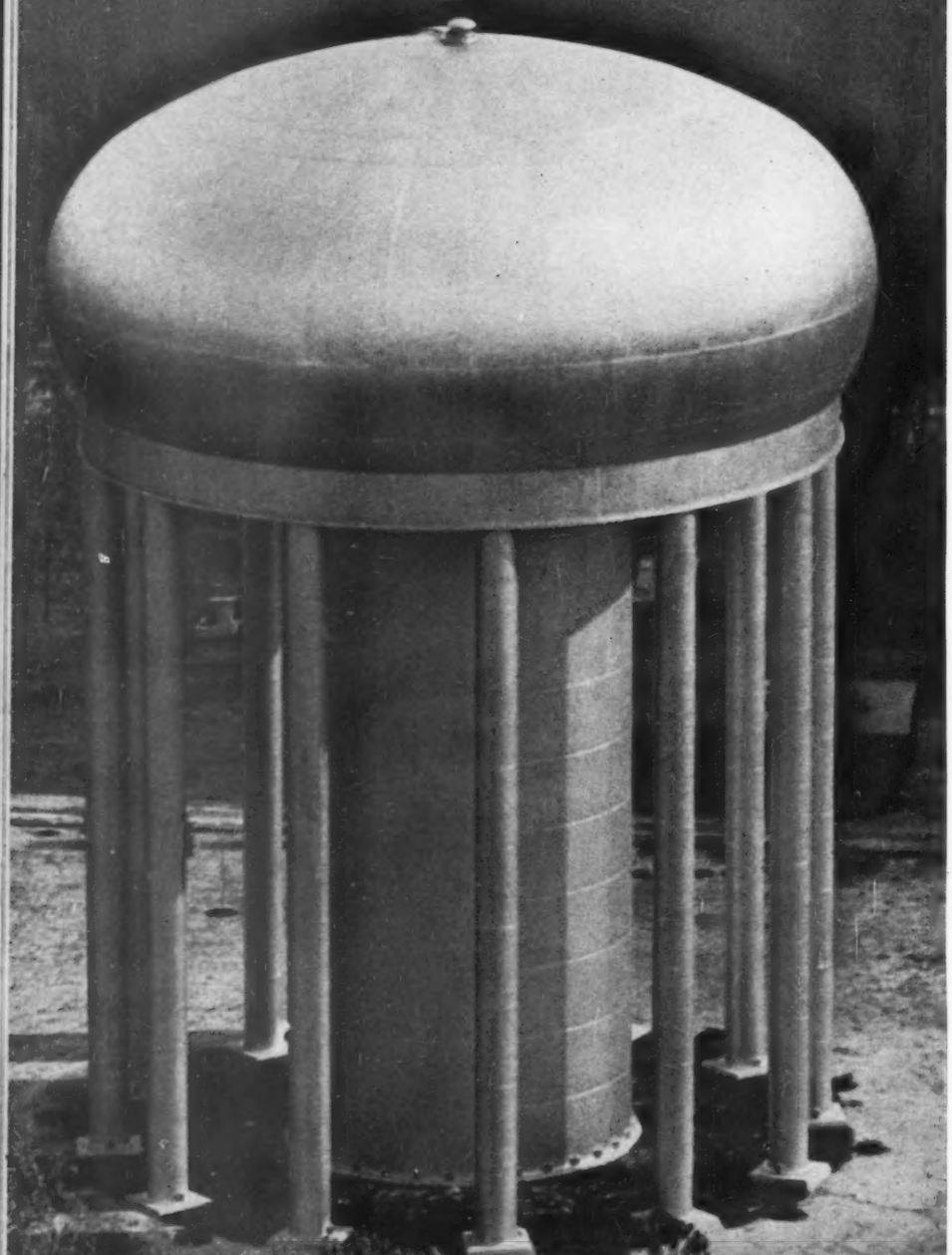
first Spheroidal ELEVATED TANK

IMPROVES SERVICE—CUTS COSTS at Jonesboro, Arkansas

• • •

FUNCTIONAL DESIGN PROVIDES BEAUTY PLUS UTILITY

After a thorough study of designs and types of elevated tanks, the City of Jonesboro decided on the functional design of the Horton spheroidal tank shown here, which incorporates beauty plus utility. In addition to the 1,000,000 gals. capacity in the tank itself, the central riser provides an emergency reserve of 500,000 gals. which may be drawn upon.



"To say we are pleased with the results is to put it mildly."—That's the way Lloyd M. Rebsamen, engineer and manager of water, light and sewerage at Jonesboro, Ark., refers to the improved service and reduced costs made possible through the installation of the 1,000,000-gal. Horton elevated storage tank shown at the left. There are several definite reasons for this enthusiasm.

Prior to November 14, 1940, when the new tank was placed in service, pressures in the distribution system at Jonesboro were balanced by the water level in a 43 year old standpipe. Due to the inadequate capacity afforded by this unit, shutdowns of pumps were only a matter of minutes, resulting in almost continuous loads on the electric plant. In addition, peak pumping periods coincided with peak electric loads.

Additional elevated storage seemed to be the answer to Jonesboro's water supply problems. On checking with the Arkansas Fire Prevention Bureau, it was found that the installation of an elevated tank that would provide about 1,000,000-gals. capacity in the upper storage range, together with a connecting water main from a substation, would give the city a Class 1 insurance rating.

To make a long story short, the Board of Directors for the City of Jonesboro approved the new Horton tank. That this decision was well warranted is attested to by these results:

(1) Power consumption per thousand gallons of water delivered into the system showed a marked drop; (2) Pressure charts show that distribution pressures before the new tank went in service fluctuated between 35 to 60 lbs., with temporary surges rising as high as 80 lbs. After its installation it was possible to hold pressures practically constant, with surges eliminated; (3) Electric plant was able to drop about 300 hp. of well and pump motors from on-peak periods; and (4) On completion of a survey of the effect of the new tank and other water line improvements, the Fire Prevention Bureau awarded the City of Jonesboro with the only Class 1 insurance rating in the state.

These advantages show what can be done with modern elevated storage to improve municipal water service.

CHICAGO BRIDGE & IRON COMPANY

BIRMINGHAM • CHICAGO • CLEVELAND • DETROIT • HAVANA • HOUSTON
NEW YORK • PHILADELPHIA • SAN FRANCISCO • TULSA • WASHINGTON

Conservation Sounds a Patriotic Call

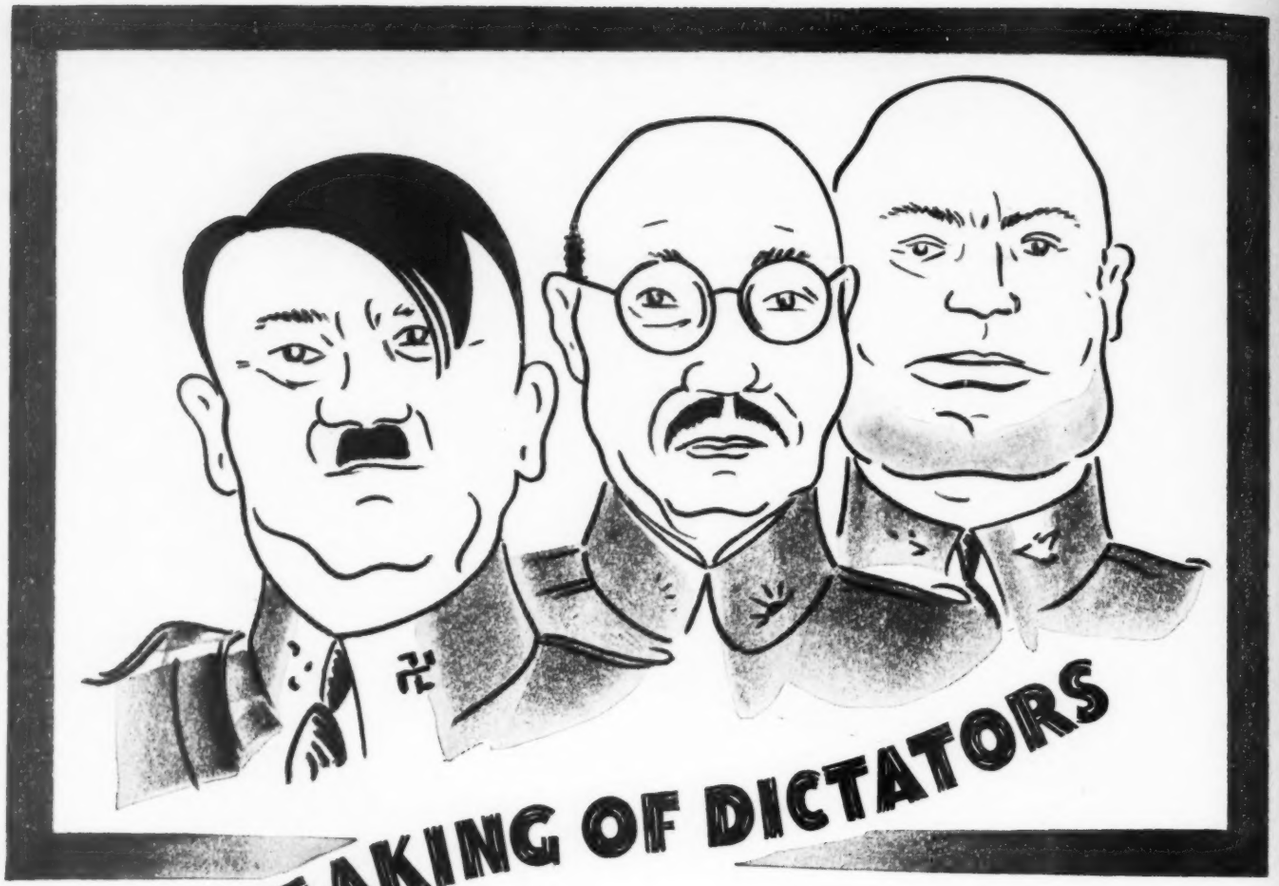
CONSERVATION of meters is a patriotic duty. The Water Works Superintendent has a double conservation responsibility—first to conserve water and second, to conserve equipment. He must take steps to put water meters in "good as new" condition so that they can continue to curb waste and protect revenue.

Those farsighted communities which invested in Badger Water Meters will be faced with less expense in their adjustment and repair programs. . . . Badger's low maintenance cost — as little as 1c per meter per year in many communities — is vital today — not only to present users but to those who are planning to put in meters to conserve water and save revenue.

Plan to attend the American Water Works Association Convention— Chicago June 21-25

BADGER METER MANUFACTURING CO., MILWAUKEE, WIS.

Branch Offices: New York City • Tampa, Fla. • Seattle, Wash. • Savannah, Ga. • Kansas City, Mo. Marshalltown, Iowa • Waco, Texas • Los Angeles, Cal. • Chicago Ill. • Philadelphia, Pa.



SPEAKING OF DICTATORS

THE kind of water found in your own locality dictates the type of water conditioning equipment you should have. Water differs greatly in hardness, sediment, and chemical make-up in different locations. Likewise, its uses and applications vary. As a result it is seldom that two water conditioning jobs present the same problems.

Graver has studied the water conditioning requirements of hundreds of municipalities and during the past 30 years has designed and built the equipment to meet these requirements. We can provide not just one type, but all types of conditioning equipment. Consequently, when Graver engineers tackle a problem it is not with the idea of selling one specific type of conditioner, but rather to analyze the situation and then design and build the equipment best suited to the particular job at hand. In every transaction, the recommendations of Graver engineers are based not upon what we have to sell, but upon what will best meet your needs.

If you have a water conditioning problem it will pay you to bear this fact in mind — and consult Graver.

GRAVER

GRAVER TANK & MFG. CO., INC.

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4809-14 TOD AVE.
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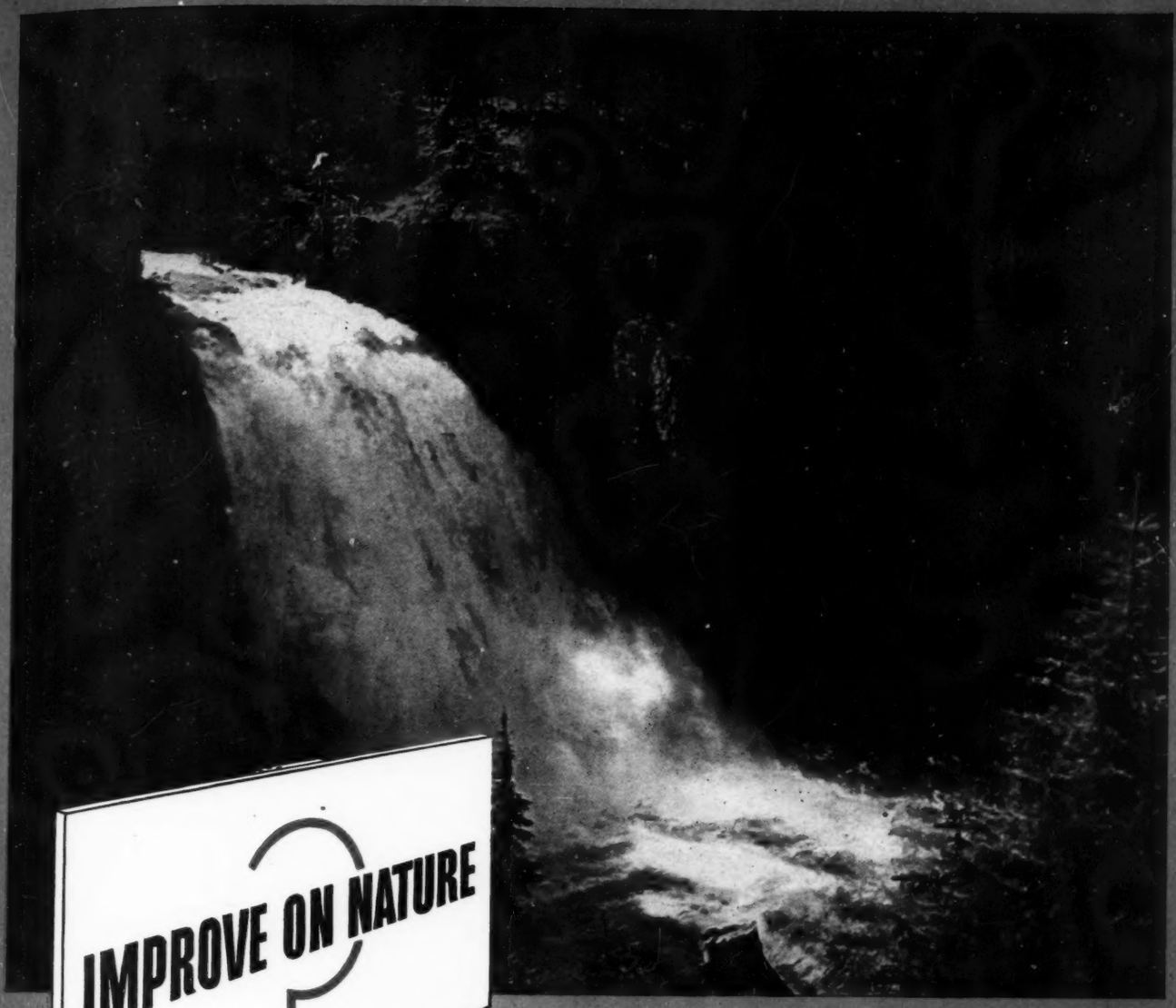
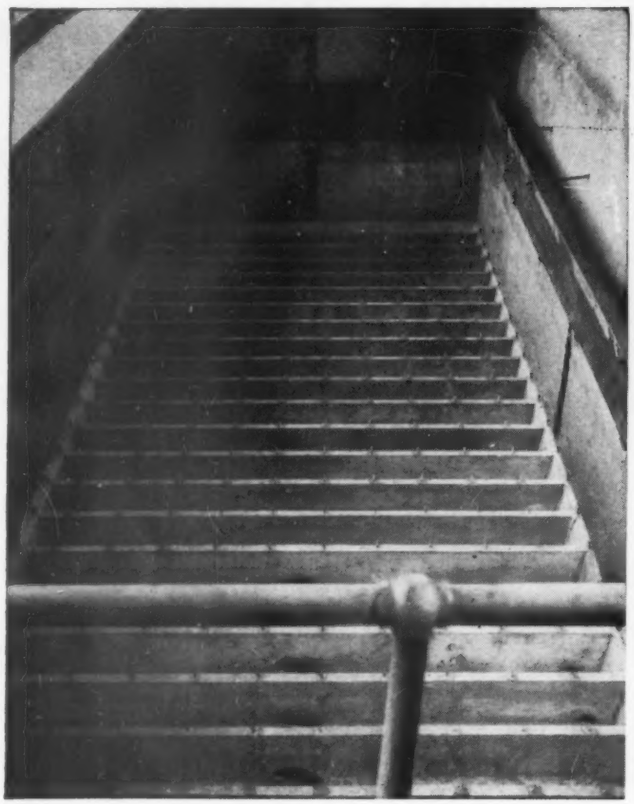


Can we improve on Nature? Certainly not on the beauty of a magnificent waterfall!

But since "raw" water frequently must be treated to make it suitable for our use, engineering skill is called upon to assist Nature by correcting various conditions.

For water treatment, DIAMOND LIQUID CHLORINE is the first choice of municipal engineers everywhere, because they know that DIAMOND Liquid Chlorine is uniformly pure and absolutely dependable. Standardize on DIAMOND Liquid Chlorine and you will always have the best!

DIAMOND ALKALI COMPANY Pittsburgh, Pa., and Everywhere



Supporting ridges before installation of plates

Finished bottom before application of sand

At DANVILLE, ILLINOIS

Mr. Arthur F. Ell, *General Manager* Mr. Martin M. Symons, *Chief Engineer*

another money saving installation of the Aloxite Brand Porous Underdrain System

MR. Symons at Danville was confronted with costly filter bottom troubles . . . a condition that almost every waterworks man eventually faces where graded gravel supports filter media. Today the answer to this and other problems . . . "coning" and upset of gravel—loss of sand—mud balls—corrosion etc. . . . is provided by the Aloxite Brand Porous Underdrain System.

All gravel is eliminated—it is impossible to lose the filter media—thorough washing is inherent—and the underdrain plates are permanently resistant to corrosion. Additional benefits are decreased construction cost and lower operating heads because of the reduced overall filter depth.

Perhaps you need to rehabilitate old filters where washing is inadequate due to insufficient distance between filter media and wash troughs. By eliminating the gravel the filter media is lowered and sufficient head is gained for an adequate washing rate.

Write for further details. Our Sanitary Engineers are at your service.

POROUS CARBORUNDUM PRODUCTS

THE CARBORUNDUM COMPANY • NIAGARA FALLS, N.Y.

REG. U. S. PAT. OFF.

(Carborundum and Aloxite are registered trade-marks of and indicate manufacture by The Carborundum Company)

SIMPLEX AND DEFENSE

Simplex equipment is playing its dependable part in ordnance plants, cantonments, government bases, and airports, as well as in civilian life in the United States and its possessions. Specify Simplex and be sure.

MS & MO VENTURI TYPE METERS — PRIMARY DEVICES — SAND EXPANSION GAUGES — AIR VALVES — RATE OF FLOW CONTROLLERS & GAUGES

SIMPLEX VALVE & METER CO., 6743 UPLAND ST. PHILADELPHIA, PA.

JUNE 21, 1942 is the opening day of

The 62nd Annual Meeting of the American Water Works Association

All meetings and the exhibit will be staged in the Stevens Hotel, located on Michigan Avenue facing the lake front only a short distance from the main business district of this great "Second City of the Nation."

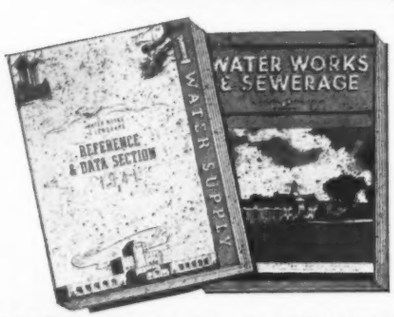
Attendance at the conferences has been increasing annually and it is hoped that this year will exceed all others. Due to this being a conference on wartime water works problems, its importance to the industry and membership cannot be overestimated.

Your Conference Planning Committee has arranged for ample hotel accommodations and for a fine exhibit of material and supplies.

Plan now to attend.

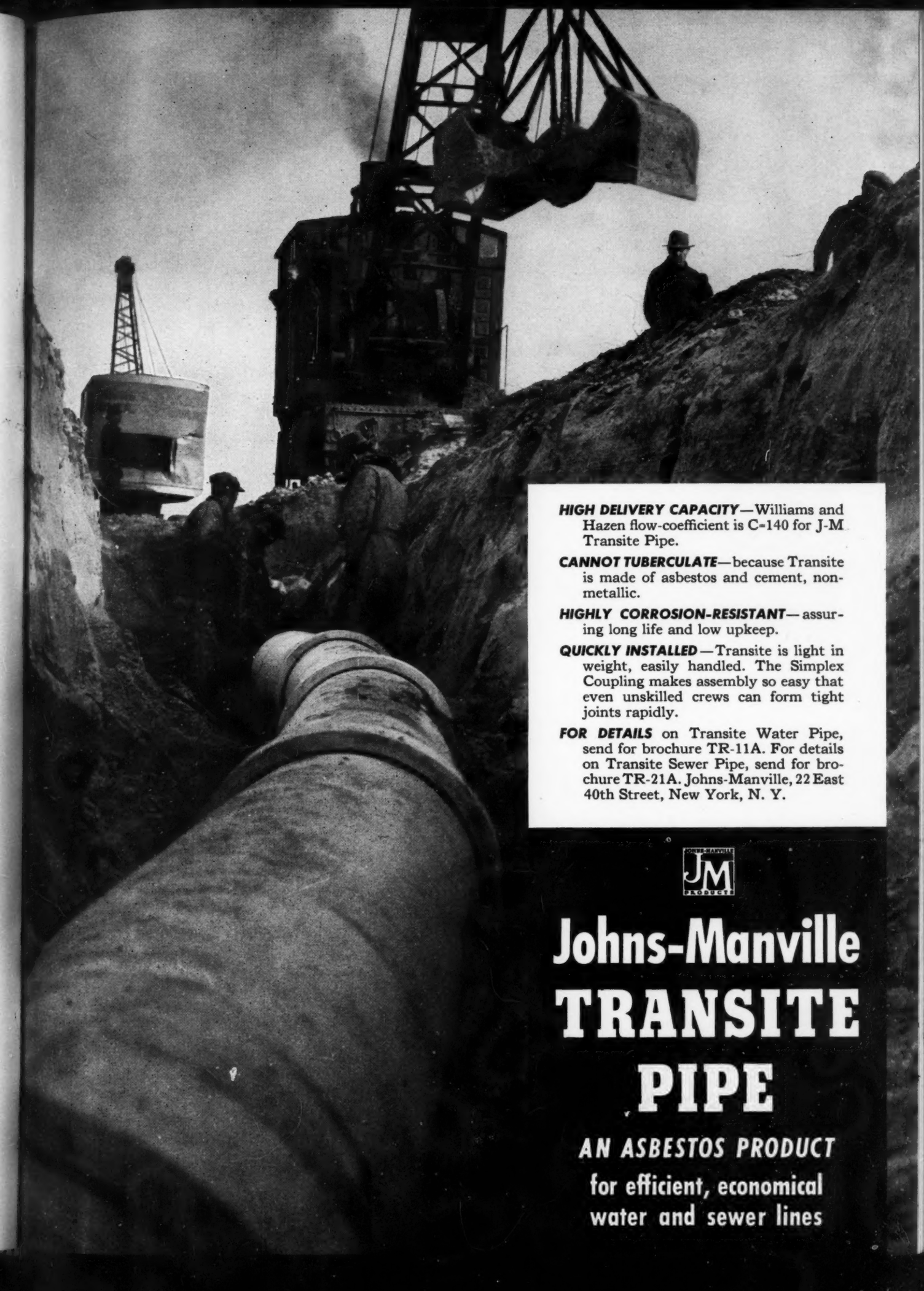
JUNE 10, 1942, closing date of the June

Convention and Reference Data Edition of Water Works and Sewerage.



One of the outstanding advertising "Buys" of the year—Last year's issue of over 400 pages reached an all time high for publications covering these two fields. — Plan now to be represented in this important issue.

WATER WORKS & SEWERAGE • 330 SOUTH WELLS STREET • CHICAGO • ILL.



HIGH DELIVERY CAPACITY—Williams and Hazen flow-coefficient is C=140 for J-M Transite Pipe.

CANNOT TUBERCULATE—because Transite is made of asbestos and cement, non-metallic.

HIGHLY CORROSION-RESISTANT—assuring long life and low upkeep.

QUICKLY INSTALLED—Transite is light in weight, easily handled. The Simplex Coupling makes assembly so easy that even unskilled crews can form tight joints rapidly.

FOR DETAILS on Transite Water Pipe, send for brochure TR-11A. For details on Transite Sewer Pipe, send for brochure TR-21A. Johns-Manville, 22 East 40th Street, New York, N. Y.

JOHNS-MANVILLE JM PRODUCT

Johns-Manville TRANSITE PIPE

AN ASBESTOS PRODUCT

for efficient, economical water and sewer lines

Calgon treatment *WORKS*

— in any of these waters!

SCALE prevention and corrosion control *used to be* a merry-go-round of troubles. Solving the scale problem often introduced corrosion —and safety from corrosion could usually be obtained only by forming scale. Now, Calgon *ends* this dilemma — solves four major treatment problems *without causing new ones.*

Soft corrosive water riddles piping and plagues consumers with "red water." Adding alkali to retard corrosion by means of a scale coating usually forms too much scale in lines near the plant and not enough at farther points. Calgon works differently. It maintains a thin, protective film over pipe metal and metal oxides throughout the system and reduces the attack of oxygen so effectively that corrosion ceases to be a serious problem and "red water" is eliminated.

"Red water" also results from precipitation of dissolved iron from well water, upon exposure to air, where the dissolved iron exceeds 0.3 ppm. Iron removal equipment is usually not employed unless dissolved iron exceeds 1 ppm., and even then it is not uncommon for "red water" to continue because of corrosion induced by oxygen dissolved in the water during the iron removal process. The best procedure is to add Calgon to well water as it is pumped. This prevents precipitation of dissolved iron and eliminates "red water" and the need for costly removal equipment.

Lime-soda softened water, after filtration, usually contains excess calcium carbonate in solution. Unless this supersaturation can be effectively controlled, scale will form in water lines and hot-water heaters. Effective stabilization, with complete security from corrosion, can best be obtained with Calgon. Added after the softening process, it stabilizes water throughout the system, and eliminates precipitation of calcium carbonate scale in hot-water heaters.

Hard high-bicarbonate water causes scale in consumers' heating coils, tanks and hot-water lines. Calgon offers a simple, economic means of stabilizing water and eliminating scale from home water systems.

The amount of Calgon* required for any of these treatments is extremely small — from 1 to 5 ppm., depending upon individual plant conditions. Costs are well within the budget of most water departments. Write for complete information and a sample for making your own tests.

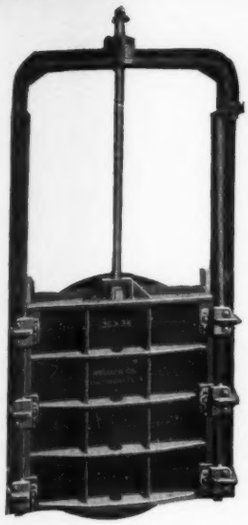
**Calgon is the registered trade-mark of Calgon, Inc. for its vitreous sodium phosphate products.*

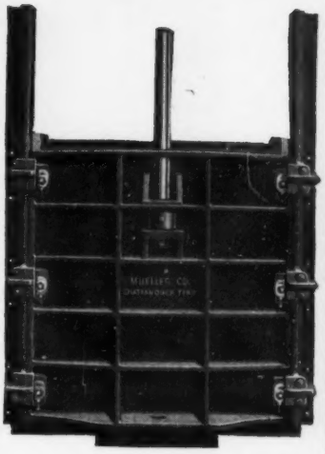
calgon, inc.

HAGAN BUILDING PITTSBURGH, PA.

MUELLER COLUMBIAN LINE OF

SLUICE GATES
FLOOR STANDS
GATE HOISTS
SHEAR GATES
FLAP VALVES
MUD VALVES





Mueller-Columbian Water Control Equipment is noted for its enduring strength and unfailing performance because of the simplified design and perfected manufacturing methods. Each piece of equipment is carefully made to exacting standards and checked and tested at the factory to insure easy operation and trouble-free operation when installed.

Not only does Mueller-Columbian fill regular requirements, but an engineering department is at your disposal to assist in the solution of any special problem and to recommend and provide the RIGHT equipment to do the job. Get in touch with Mueller-Columbian on your next water control project. Quotations and detailed information will be gladly furnished upon request.

Mueller Co., Chatta., Tenn.

Mueller Co., Dept. B

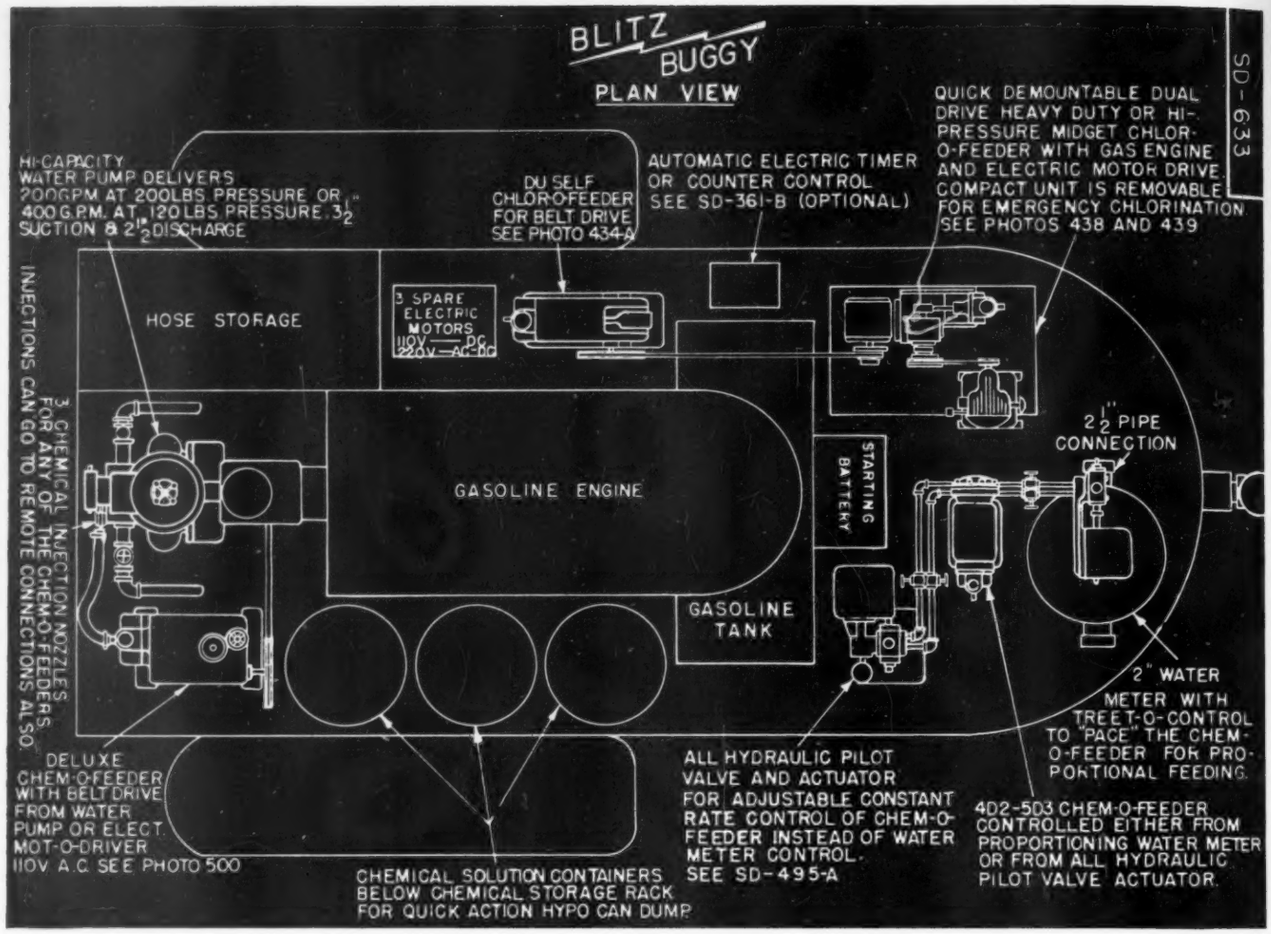
Chatta., Tenn.

Kindly send me your new A-300 Catalog on Water Control Equipment.

Name .....

Address .....

City .....


BLITZ BUGGY
PLAN VIEW
SD-633
HI-CAPACITY WATER PUMP DELIVERS 200GPM AT 200LBS PRESSURE OR 400 G.P.M. AT 120 LBS PRESSURE. 3½" SUCTION & 2½" DISCHARGE
DU SELF CHLOR-O-FEEDER FOR BELT DRIVE SEE PHOTO 434-A
AUTOMATIC ELECTRIC TIMER OR COUNTER CONTROL SEE SD-361-B (OPTIONAL)
QUICK DEMOUNTABLE DUAL DRIVE HEAVY DUTY OR HI-PRESSURE MIDGET CHLOR-O-FEEDER WITH GAS ENGINE AND ELECTRIC MOTOR DRIVE. COMPACT UNIT IS REMOVABLE FOR EMERGENCY CHLORINATION SEE PHOTOS 438 AND 439
HOSE STORAGE
3 SPARE ELECTRIC MOTORS 110V—DC 220V—AC-1ø
INJECTIONS CAN GO TO REMOTE CONNECTIONS ALSO
3 CHEMICAL INJECTION NOZZLES FOR ANY OF THE CHEM-O-FEEDERS
GASOLINE ENGINE
STARTING BATTERY
GASOLINE TANK
2½" PIPE CONNECTION
2" WATER METER WITH TREET-O-CONTROL TO "PACE" THE CHEM-O-FEEDER FOR PROPORTIONAL FEEDING.
DELUXE CHEM-O-FEEDER WITH BELT DRIVE FROM WATER PUMP OR ELECT. MOT-O-DRIVER 110V A.C. SEE PHOTO 500
ALL HYDRAULIC PILOT VALVE AND ACTUATOR FOR ADJUSTABLE CONSTANT RATE CONTROL OF CHEM-O-FEEDER INSTEAD OF WATER METER CONTROL. SEE SD-495-A
4D2-503 CHEM-O-FEEDER CONTROLLED EITHER FROM PROPORTIONING WATER METER OR FROM ALL HYDRAULIC PILOT VALVE ACTUATOR.
CHEMICAL SOLUTION CONTAINERS BELOW CHEMICAL STORAGE RACK FOR QUICK ACTION HYPO CAN DUMP

% Proportioneers % BLITZ BUGGIES

"TAILOR-MADE" TO ANSWER YOUR EMERGENCY NEEDS!

Study drawing SD 633, above. It is a plan view of a complete "tailor-made" Blitz Buggy, a mobile chlorination unit to protect your water system against war time pollution. It includes pumping, purification, fire-fighting, and decontamination units with necessary accessory equipment. It is built so that many of the units can be quickly dismounted and left on location while Blitz Buggy goes on to the next danger point.

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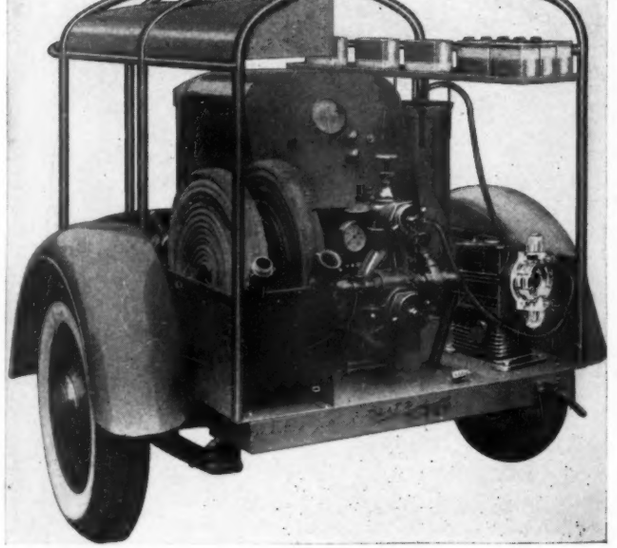

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Emergency Chemical Feeder Headquarters

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WATER WORKS & SEWERAGE

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L. H. Enslow, Editor

COMING!

"Operating Experiences at Gary, Ind."

Is a worthy report of operating experiences at the new activated-sludge plant of Gary, Indiana, during a period of more than a year. This plant, producing its own power from digester gas and designed to handle ground garbage, has several novel design features. This article, scheduled for this issue will be featured in June. The authors—
L. R. HOWSON, Designing Engineer,
and
W. W. MATTHEWS, Plant Superintendent.

"The Hardy Cross Method Simplified"

Know your distribution system!—might well have been the title of this paper. It is generally accepted that the Hardy Cross method for ascertaining the expected pressures and flows at various fire hydrants and important services on gridded distribution systems, and increase in the efficient and economical design of new distribution systems or in the strengthening of old systems, is the best method that has been offered. Only one obstacle has prevented its wider usage by designers generally and by operating engineers and superintendents—that is its complicity. Now, a superintendent who has put the method to practical use finds it subject to marked simplification. Stripped of its involved mathematics a simplified Hardy Cross method, designed for "everyday use by us country boy superintendents," is another worthy contribution of—
D. R. TAYLOR, Plant Sup't,
Roanoke (Va.) Water Department.

"Gas Engine Operation and Performance"

Is the story of the performance record, dependability and economies of the gas engines of the medium sized sewage treatment works of Aurora, Ill. The first article to be published on the early Aurora installation of 1936 appeared in 1937 in this magazine. It is fitting that the story of the completed job and long-time performance records be told in the same publication in 1942, after a 15 month period of operation since past experience justified the complete severance of outside power and confident dependance on the by-product gas operated engine-generator sets of Aurora. This accomplishment represents another feather in the cap of the resourceful—
WALTER A. SPERRY, Sup't,
The Sanitary District of Aurora, Ill.

"A Study of Cathodic Protection of Steel Tanks"

Has been made in a most thorough-going manner by the Bureau of Water of Baltimore, Md. The findings in this study reveal many little appreciated considerations in this electrical protective process. Some theories heretofore advanced as to why the process protects against corrosion have been upset. New considerations have been indicated and suggestions for insuring greater protectivity, as well as economy of electric current and longevity of equipment, are advanced as the outgrowth of the operating studies together with knowledge of behavior of electro-plating processes akin to that of cathodic protection. Without question the Baltimore report reveals more concerning Cathodic protection that is basic, and gives the story clearer, than anything that has yet been said concerning this process, which the report concludes to have been shown to possess marked merit as an anti-corrosion measure. The investigator and author is—
GORDON L. O'BRIEN, Designing Eng'r,
Bureau of Water Supply, Baltimore, Md.

"The Maintenance of Fire Hydrants"

Is an article which needs no further comment other than to say that it is being published at a time when National preparedness and the increasing uncertainty of continued allocation of metals for new hydrants, or even replacement parts, makes it justified to write MAINTENANCE and CONSERVATION in capital letters. When this article is seen in our Annual Reference and Data Number the reader will know why we chose as the contributor—
EUGENE T. CRANCH, Manager,
New Rochelle (N. Y.) Water Co.

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WATER WORKS & SEWERAGE

VOL. 89, No. 5 *A Gillette Publication* MAY, 1942

WATER SOFTENING IMPROVEMENTS FOR KANSAS CITY

By MELVIN P. HATCHER*
Chief Engineer and Superintendent
Water Department
KANSAS CITY, MO.

PRIOR to 1928 the City of Kansas City was served with Missouri river water treated only by coagulation and clarification and followed by chlorination without filtration. In 1928 the city completed a new water purification plant of the conventional settling basin and rapid sand filter type having a nominal capacity of about 100 million gallons per day. Today the city is adding facilities to this plant which will provide for a reduction in the hardness of the treated water from its present average of about 215 parts per million to a hardness of 90. Barring too much delay in the delivery of materials, the plant should be ready for operation early in 1942.

[Having obtained an A-10 Project Rating in December, 1941, and having overcome certain delays in spite of this rating, it still appears at this date that softening will be started in June, 1942, if not earlier.]

Water softening has a popular appeal in Kansas City. The idea has been approved several times by the voters, but for one reason or another the plan was never carried out. Water softening had its last approval at the polls in 1931 as a part of a so-called Ten Year Plan. A $32,000,000 bond issue for that plan had $550,000 earmarked for softening improvements. The mandate of the voters was not carried out in this instance, mainly, it appears, because of the increase in operating costs that would result from softening. The people were made to understand that these operating costs could be provided for only by an increase in rates.

The Author

Softening to Be Paid For From Savings Effected in Reorganization

In 1940 the administration of the affairs of the Water Department was changed to an extent that permitted generous savings in the expenses of operation due mainly to a reduction of about 30 per cent in operating personnel. The water softening improvements now under contract and costing nearly $900,000 are being constructed out of Water Department revenue and the additional operating expense for softening (estimated at $150,000 to $200,000 per year) will be borne by the Water Department without an increase in rates.

The Missouri river water has an average hardness of about 215 p.p.m., of which about 155 p.p.m. is carbonate hardness. The turbidity of the water averages about 2,500 p.p.m. with a maximum running as high as 15,000 to 20,000 p.p.m., of which a large portion is heavy suspended matter readily removable by primary settling without the aid of coagulation. The dissolved color in the water is negligible.

To treat water with these characteristics, the present treatment plant provides plain primary sedimentation in circular basins provided with clarifier mechanisms followed by spiral-inward-flow mixing tanks, coagulation basins in two sets, and rapid sand filters. (See General View of existing plant and Flow Diagram showing additions for softening.) The retention periods through the present plant at the nominal rate of 100 m.g.d. are as follows:

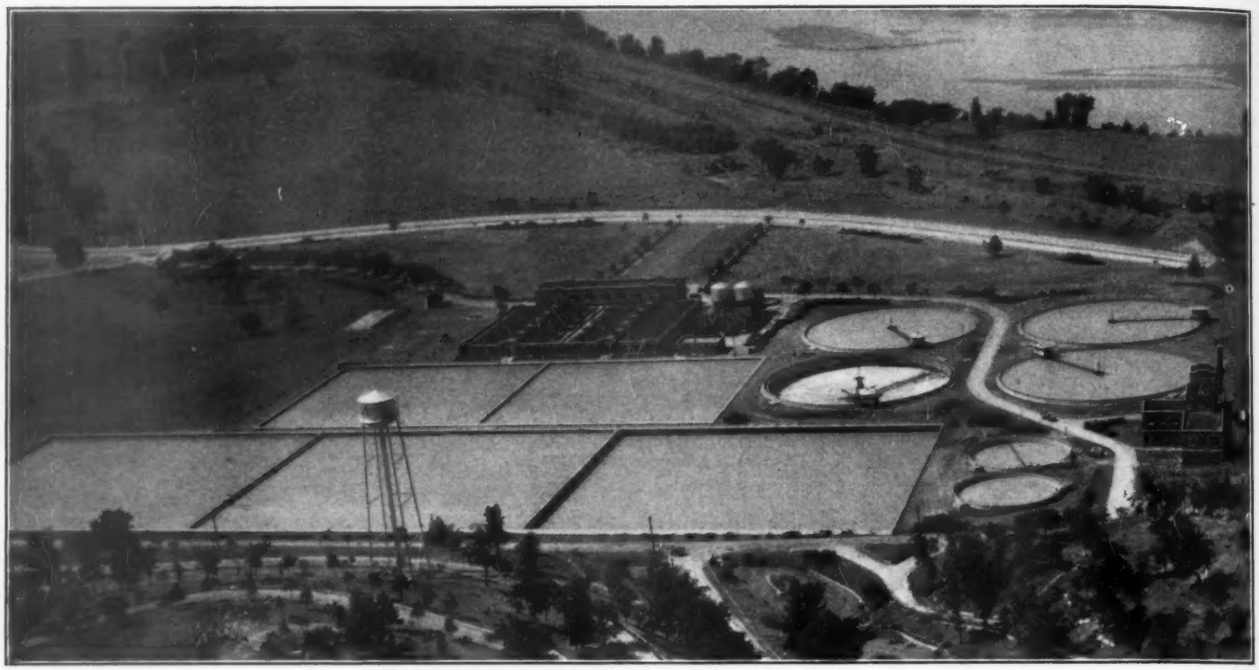
	Hrs.
Plain settling basins with clarifiers	4.0
Mixing tanks	.5
Coagulating basins:	
Primary	9.0
Secondary	3.5
Total	17.0

In the present plan of treatment, lime and alum are being used as coagulants, cake alum being made for the plant, on the grounds, from bauxite and sulphuric acid. In the proposed plan, lime and soda ash will be used for softening. Where about 400 pounds of coagulant per million gallons of water treated has been used for conventional treatment, softening will require the application of about 1,600 to 1,800 pounds of lime, soda ash and alum.

*This paper, presented by the author before the Missouri Valley Section of A. W. W. A., is reproduced by permission of the Association.

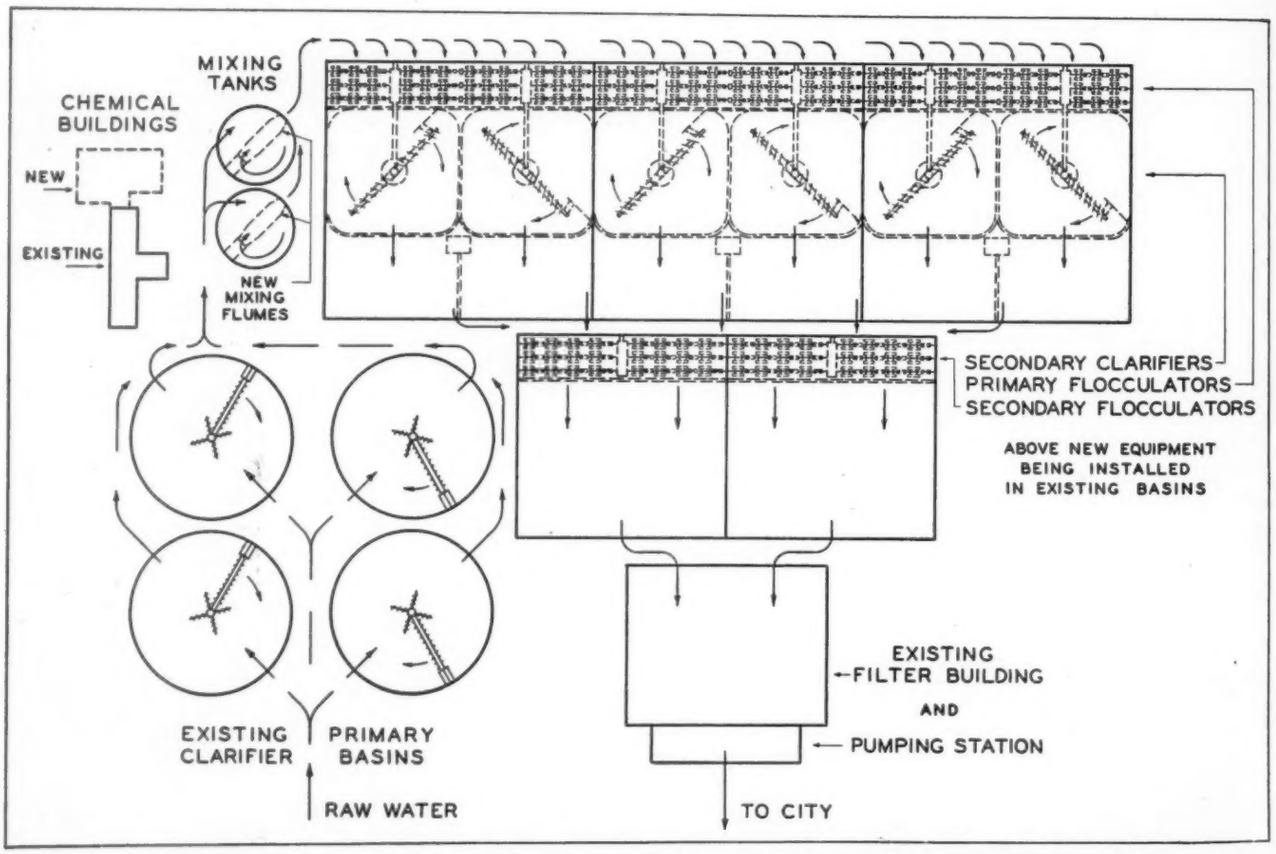
The New Chemical Building

The contemplated use of this greater volume of chemicals brought about the need for more storage capacity and better chemical handling and feeding facilities than were available in the present chemical building. An important unit in the improvements now being made is, therefore, a new chemical storage, handling and feeding building cost-



The Filtration Plant of Kansas City, Mo.

This 100 M.G.D. plant completed in 1928 is now being converted to a 150 M.G.D. softening plant with a minimum of construction at a cost of less than $900,000. The converted plant will have 50% more capacity without adding a single basin or a filter.



Flow Diagram—Showing Locations of Improvements for Converting to a Lime-Soda Softening Plant.

ing about $250,000. Except for the manufacture of alum in the old building, the new structure could have completely displaced the old.

The new Chemical Storage and Handling Building (see cut) consists mainly of six (6) cylindrical storage bins 20 feet in diameter and about 45 feet high, from which bins the chemicals will feed by gravity to four (4) dry feed machines for alum or soda ash and four (4) dry feed machines with slakers for feeding lime. Each bin has a storage capacity of about 12,100 cubic feet; this volume will hold 300 tons of alum, 330 tons of lime, or 390 tons of soda ash. Under conditions of maximum chemical demands for treatment at maximum plant capacity, the bins will hold about ten days' to two weeks' supply of chemicals. Lime for softening is available from several kilns in Missouri no farther away from Kansas City than about one or two days' freight travel time. Chemicals will be delivered to the plant in hopper bottom cars, discharged into hoppers below a shed-covered track and transported from these hoppers to the bins by continuous chain bucket elevators.

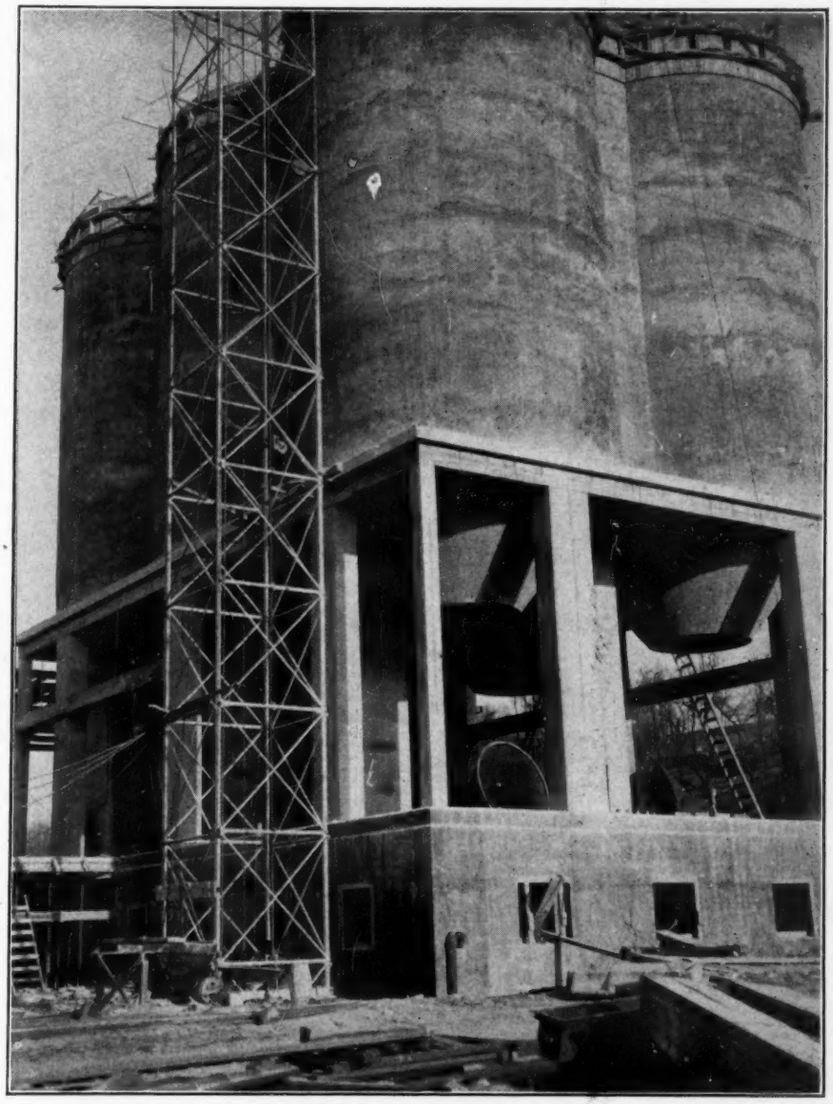
Designed for Break-Point Chlorination

The provisions for chlorine handling, storage and application are generous to an extent that anticipates the likelihood that "break-point" chlorination may prove to be a necessary part of the treatment processes. The chlorine room provides the space for storing forty (40) to fifty (50) one-ton chlorine containers. Provisions for handling these include a hoist for unloading containers from railroad cars and overhead trolley system for handling the containers in storage. An exhaust fan has been provided as a safety measure to guard against the accumulation of chlorine in the storage room should there be leakage from the containers. Rubber lined pipe is used to convey the chlorine water from two (2) Wallace & Tiernan chlorinators to the several points of application.

Flocculation and Clarification Facilities

It has been apparent in all of the studies made of plans for softening Kansas City's water supply that there was no need for additional basin capacity since existing coagulating basins offered a 12.5 hour retention period at the nominal plant rate of 100 m.g.d. Therefore, the problem of providing for softening in the present plant was mainly one of deciding on the best possible arrangement of equipment in the present basins to provide for longer and better mixing of chemicals and mechanical flocculation, and for the concentration and removal of the bulky sludge resulting from softening.

In the studies made preliminary to the development of the present plans, consideration was given not only to the flocculator-clarifier type of equipment which was finally chosen, but also to a number of different arrangements of this kind of equipment in the different basins, and likewise to the sludge blanket type of mixing and up-flow clarification equipment. Rather complete studies were made of both of these kinds of equipment, including layout drawings and estimates. In the final analysis, the most satisfactory and economical arrangement was found to include paddle-type flocculators and cross-flow clarifiers built into the present primary basins and flocculators in the secondary basins in the manner shown in the accompanying flow diagram. This diagram can better be understood by comparing it with the general view of the existing plant. The economy of the plan adopted becomes plainly evident. The advantage of accelerated reaction and shortened retention period claimed for the sludge blanket equipment was subject to some discount in our case because of the basin capacity already available for use, and the relative simplicity of installing flocculation and sludge removal mechanisms therein.



The Six Giant Chemical Bins

Each with a capacity of 12,100 cu. ft. are 45 ft. high and 20 ft. in diameter, almost rivalling some of K.C.'s famed wheat storage bins. Each bin will hold alum—300 tons, lime—330 tons, soda ash—390 tons. Directly beneath will be the chemical feeders. The materially enlarged chlorination station is on the ground floor.

Consideration was given also to the lime-zeolite plan of softening in comparison with the lime-soda ash plan. Although there appeared to be some saving in operating expense in the lime-zeolite plan, the saving was not enough to outweigh the rather considerable investment required in a zeolite plant and equipment.

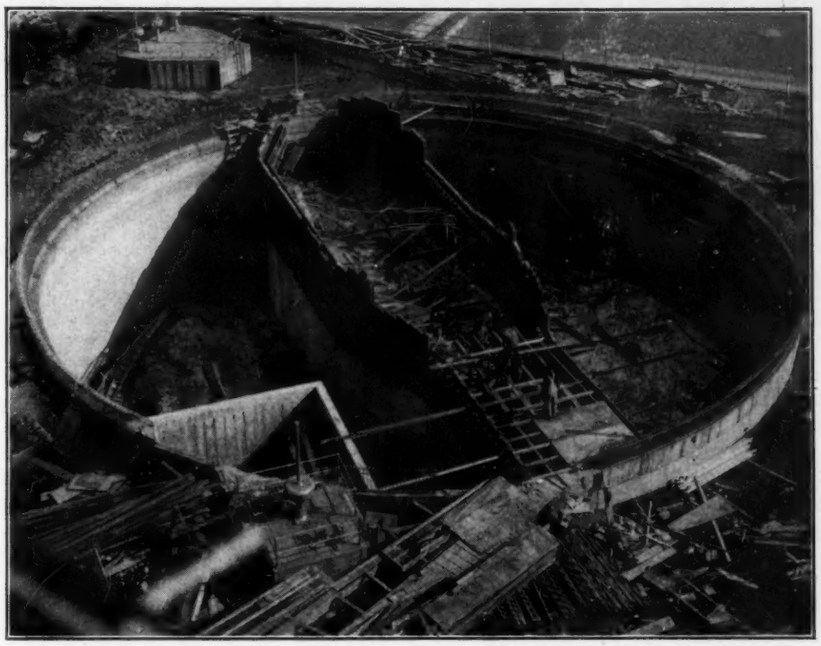
In summary then, the improvements for softening include mainly a new chemical storage and application building, flocculator and clarifier equipment in existing basins, together with new chemical handling and feeding facilities and sludge removing equipment. The extent and arrangement of present basins and conditioning facilities, as well as the location of the new mixing, flocculator and clarifier equipment, are shown in the flow diagram referred to. It should be noted, too, that the path of the water through the treatment works remains practically unchanged.

Construction Progress Views.

Showing clarifier pedestals being installed in the inflow ends of existing manually cleaned clarification basins. The flocculation chambers are seen across the near ends of the basins. The contractors, faced with irregularities and delayed deliveries of equipment, found it necessary to rotate their work from basin to basin in order to save time and expense on the project.

Increases Plant Capacity by 50 per cent

Of considerable importance to the whole scheme of things is the fact that improved conditioning of the water in the basins, due to lime treatment, will permit an increase in the rating of filters from the conventional two gallons per square foot per minute to three gallons per minute per square foot. This rerating of filters will enable the plant to treat and filter about 150 million gallons per day, an increase of 50 per cent in the nominal capacity of the treatment works. Some of this increased capacity is needed now, since the present capacity of the plant has been reached on days of maximum demand. In other words, except for the additional pumping equipment needed, the treatment plant capacity has been increased by 50 million gallons per day; this capacity, if and when that capacity is needed, is worth in itself about as much as the total cost of the softening improvements.



One of the Hydraulic-Jump Flumes.

Being constructed across the two old mixing tanks to provide flash mix and efficient chemical distribution ahead of the new mechanical flocculators. The water is first prechlorinated, the old mixing tanks serving as contact units at the low pH, before the softening chemicals are added, as it leaves these tanks by way of the hydraulic-jump mixing flume.

Hydraulic Jump for Flash Mix

Quick or flash distribution of chemicals and mixing will be accomplished in two hydraulic jump flumes set atop the present spiral-inward-flow mixing tanks. (See cut.) Incoming raw water will pass through the mixing tanks first before flowing into the hydraulic-jump mixing flumes. This arrangement will permit continued prechlorination, with the old mixing tanks providing a contact period for the chlorine at a lower pH than is available at any subsequent point in the treatment.

Retention Periods Through the Converted Plant

The sequence of treatment and the retention periods of the various treatment units for both the 100 m.g.d. and the 150 m.g.d. plant rates as arranged by the new softening plant are shown in the following tabulation:

	100 mgd. Hrs.	150 mgd. Hrs.
Primary clarifier basins	4.00	2.67
Chlorination contact tanks	.5	.33
Mixing flumes	....	....
Primary flocculators	1.60	1.04
Secondary clarifiers	4.52	3.03
Intermediate sediment basins	2.88	1.93
Secondary flocculators	.83	.55
Final sedimentation basins	2.67	1.78
Totals	17.00	11.33

Costs and Savings

The added expense of softening, not including fixed charges on the improvements now being made, is estimated at about $178,500 per year based on the treatment of 23,014 m.g. of water per year. Following is a summary of the figures supporting this estimate of added expense:

Lime ...16,200 tons at $ 9.05	$146,610
Soda ash 1,650 tons at 24.30	40,095
Alum .. 1,600 tons at 16.30	26,080
Carbon dioxide	5,705
Ammonium sulphate	2,200
Chlorine	4,200
Power	9,310
Operating labor, miscellaneous expense	65,800
Total expense	$300,000
Comparable expense before softening	121,500
Net softening expense	$178,500

Against this added expense, the saving to the water consumer because of decreased soap consumption is estimated conservatively at 87.5 cents per capita, or $350,000 per year. There will, of course, be other savings, such as lower maintenance on house plumbing and hot water heaters, lower industrial softening costs and less wear and tear on laundered fabrics.

Equipment Suppliers and Contractors

The flocculator and clarifier equipment is being furnished by the Dorr Company, Inc.; chemical feeding and lime slaking equipment by the Omega Machine Co., Kansas City, and the chemical transporting equipment by the Link-Belt Co. Construction work is being done by contract by S. Patti Construction Co., Kansas City. A summary of all contracts follows:

Chemical conveying equipment (Link-Belt Co.)	$ 18,043
Chemical feed equipment (Omega Machine Co.)	19,497
Basin equipment (The Dorr Co.)	196,000
Chemical building	250,000
Settling basins—additions and alterations to	376,960
Structural steel	8,303
Total cost	$868,803

Consultants

Preliminary plans for the improvements were made and reviewed by a board of engineers including representatives of the Black & Veatch and Burns & McDonnell engineering organizations, the Director of the Water Department, Kenneth K. King, and the writer. Herbert O. Hartung, Chemist for the St. Louis County Water Co., was consulted in matters relating to the probable efficiencies of the several plans of treatment considered. Final plans for the improvement were prepared jointly by Black & Veatch, Consulting Engineers, and the Burns & McDonnell Engineering Co., both of Kansas City.

A MUTUAL AID PLAN

As Developed for the Water Supply Systems of Westchester County, N. Y.

By JAMES C. HARDING
Commissioner of Public Works
WESTCHESTER COUNTY*
NEW YORK

WESTCHESTER County, located immediately north of New York City, has an area of 457 square miles and a population of 573,558. Its assessed valuation of $1,585,000,000 is exceeded by no other county—as a matter of fact, by only seventeen of the states. Individual municipalities range in size from Yonkers with a population of 142,598 to Poundridge with a population of 806. There are 42 public water supply systems within the county.

Westchester started its Mutual Aid Plan in April, 1941, under Chas. H. Sells, then Commissioner of Public Works. In October the Governor created the State Mutual Aid Plan for Water Service, headed by Earl Devendorf, Associate Director of the Division of Sanitation of the New York State Health Department. Mr. Sells was appointed Zone Coordinator for the State Plan in charge of Westchester County and was succeeded by the author in January, 1942. The Westchester Water Works Conference, comprised of representatives of all public water supply systems in the county and functioning through a committee of seven of its members, has aided the Zone Coordinator in the work done to date.

The accomplishments so far are described in the following paragraphs. It must be realized, however, that the program which we believe is good for Westchester County may not necessarily work out in other localities. Our section is well built up and the Mutual Aid Plan will be of much more value to us than to sparsely developed areas or sections where there is only one important city within an area of many square miles.

Inventory Questionnaires

We have two sets of inventories, one of which was sent out by the County Defense Council and a later one sent out on a form prepared by the Director of the State Mutual Aid Plan. These inventories cover personnel, equipment and materials and are valuable in presenting the picture of the resources of the various water departments. Our experience with the questionnaires has led to the conclusion that they should not be too voluminous. Practically every municipal department is gun-shy on the subject of forms, because of the fact that they have had so many of them on such a wide variety of subjects. The average Superintendent is apt to resent the necessity of spending much of his time filling out involved and lengthy documents of information. As far as most water systems are concerned about the only inventory information, the Mutual Aid report center requires is a list of pipe, valves and fittings of the type required for repairs.

The Author

We at first thought we would keep a perpetual inventory. However, the paper work involved would be tremendous and it would be impractical to get the various superintendents to send in monthly reports on their stock. What is really needed is a list showing the average stock carried with the understanding that if any municipality makes any considerable changes they so advise us. We decided that it would be a waste of time to try and keep an up to date record of the inventory of the smaller water systems because the larger cities have available as large a stock as a dozen of the smaller places.

Increase of Inventories Ordered

It was deemed unfair for any municipality to expect to benefit from the Mutual Aid Plan unless it, in turn, would prepare itself to take care of a reasonable number of breaks and be ready to be of assistance to other municipalities. For this reason, checking inspection has been made of practically every water system in the county by our Advisory Committee. Any Water Department or Company found to be deficient, as far as its inventory of repair parts was concerned, has been advised just what it should purchase to correct this fault and contribute its fair share in the Mutual Aid program.

Interconnections and Auxiliary Supplies

Most of the water works in Westchester County have distributing mains ending a very short distance from those of other systems. Therefore, it was felt that a great deal could be accomplished by making system interconnections. Accordingly, a map of the County was prepared to show where possible connections might be made and a number of such connections have now been installed. One difficulty we face is that different water systems have their distributing reservoirs at various elevations so that it is impossible to get satisfactory gravity flows in both directions. A further trouble is that the outlying areas adjacent to each other naturally have mains of insufficient capacity to furnish the entire requirements of the municipality. Interconnections frequently present a problem that needs a considerable amount of investigation by competent water works engineers and to date we have not found time to give it the study that it merits.

We need a portable engine-driven pumping unit that will enable us to boost water from one system to another. Fire engines can be used for this purpose but they are not designed for continuous pumping. This is also the case with most of the portable pumping units recently placed on the market. We have thought somewhat of using a belt driven centrifugal pump driven by a tractor provided with power takeoff. Some study has been given to the development of non-potable water supplies for fire fighting purposes, and to be taken from ponds or streams.

*The Central Office of the County Department of Public Works is located in White Plains, N. Y.

Personnel Training

It is our opinion that all water systems should have ample trained personnel available in their own municipalities to shut off water mains that become damaged during an incident. In the case of cities with large water departments, these men can perhaps be regular employees. However, in most smaller communities where the water departments are manned by only a few men, auxiliary personnel should be trained for this duty, given gate keys, and assigned to sections of the distribution system. This auxiliary personnel should be selected by and be under orders of the water Superintendent. Gate keys should not be handed out promiscuously to untrained men, as considerable damage could be done if valves were improperly closed or the wrong ones operated. The necessity for auxiliary personnel for some of the smaller systems is well exemplified in the Town of New Castle, which has about 60 miles of water mains spread over an area of 22½ square miles, and with only two regular employees in the Water Department.

We do not generally recommend that auxiliary personnel be trained for making water main repairs because in the first place it would be difficult to train these men adequately, and in the second place, due to the operation of the Mutual Aid Plan, we should be able to furnish the municipalities in trouble all the trained repair crews they might need. In this connection, it is to be remembered that repairs are not generally made at night, when most bombing raids occur. Therefore, we should lose no working time in moving experienced help in where needed. The same fortunate situation would not exist in areas where the cities and built up areas are more widely scattered. In exceptional cases where water systems do not have sufficient personnel to handle a reasonable number of breaks at one time we recommend that the aid of local plumbers be enlisted.

Regularly employed operating personnel should be trained in the location and operation of valves, communication methods, and the making of emergency repairs. Where, as is the case in some water systems, the event of a series of breaks may make it necessary to pull men from the office, pumping stations or other important points to assist the repair crews, consideration should be given to manning these points with auxiliary personnel.

Identification Marker for Motorized Equipment of Highway, Water, Gas and Electric Utilities

The word EMERGENCY is illuminated by a 3-candle bulb shining through a red slot, to provide lighting 10 times that of star-light.

Communications

Last February the author was taken to the County District Warning Center, shown a desk and advised that that was where he would sit during an air raid and from whence he would dispatch aid to municipalities in trouble. The mental picture was highly alarming, so we set out immediately to work up a system of communication. An office in our County Public Works Department was provided with blackout facilities and set up as a control room with two preferential wires that would not be cut off deliberately by the telephone company in the event of an air raid. Two private wires were run from this office to the District Warning Center so that conversations can be held between these two places or between the staff members in both rooms and people calling the District Warning Center. Arrangements have been made so that when the yellow warning signal is given by the Army Interceptor Command to the District Warning Center, eight members of our staff become activated to the status of *"on the alert."* It will be their duty to immediately man the Public Works telephone in the District Warning Center and the control room of the Department of Public Works.

In our control room there are available plans of all water systems in the County, inventories showing the supplies of materials and equipment available, and a list of the private and business telephones and the addresses of all water department heads and their key men, those of contractors, highway departments and other municipal agencies. Each water department head in the County has been given three confidential telephone numbers, by the use of which he can reach this control room to call for aid. He has been told that when he wants aid to repair damaged mains he should specify the size and location of the main and the time when and place where he wants the mutual aid repair truck to report.

The individual water works have been urged to make arrangements to have key men assume the alert on the yellow signal, to have a representative in the local control center during periods of emergency and to provide themselves and their key men with preferential telephone listings. We at first advised the local municipalities to obtain a list of such telephones within their corporate limits. However, we found the number was too large and it was suggested that, instead, their men inquire from police or air raid wardens (on the scene) as to the location of preferential telephones from which to make calls from the field into their own headquarters.

To assist in maintaining communication we have made arrangements whereby eight representatives of our Department residing in different sections of the County will be warned in advance of an air raid and will stay in their homes. If we judge from the reports we expect to receive in the District Warning Center every 20 minutes from air raid wardens that the situation in any municipality indicates the likelihood of serious difficulty, we can dispatch a man to find the water superintendent to see whether we can be of assistance. Our mutual aid communications must depend almost entirely on the telephone. Distances are great for messengers working in a blackout and radios are taboo except possibly a very limited use of police radio. We do have telegraph and teletype facilities.

Identification — Motors and Men

Another troublesome problem encountered was the matter of identification for trucks and staff cars and for the men themselves. There is

The Identification Badge for Officials and Key Men

The large letter on the front of the badge is of a material which reflects the least amount of light. On the rear of the badge (right) is the wearer's photograph, sealed in with a special die to prevent substitutions.

little use in having a well organized department if the wardens and police will not let your employees move around. Our various utilities—water, gas, electric and highway—have adopted a standard sign developed by our lighting company which is placed on the front of trucks and staff cars. This sign is illuminated by a three candlepower, six volt bulb shining through a red aperture and designed to provide illumination on the word *"Emergency"* equal to ten times starlight. This light is absolutely useless as far as providing illumination for driving but it can be seen some distance away to allow air raid wardens or police to identify and pass the cars without halting them. This light has not been approved by any State or Federal organization and we may find that we eventually will have to scrap it. However, we could get no definite information from any authority as to what would be approved, we felt that the need was acute, and the cost, $2.25, was not prohibitive. Our best information, and we have searched diligently, is that no car light strong enough to provide illumination for driving during blackouts has been or will be approved.

For identifying our men we have adopted a badge having on the face of it the letter "E" and made of a material that reflects the slightest amount of light. The back of the button bears the photograph of the wearer. This photograph is sealed in with a special die so that no other photograph can be substituted. The badges all have a serial number and are given out by the Defense Council only upon the approval of our office. Use of these badges is being restricted to key men.

The customary form of identification, the arm bands and cards, did not seem satisfactory to us. All our men have been fingerprinted and photographed and carry a card with thumb prints and photograph. However, it would cause considerable delay if one has to fish a card out of ones pocketbook very often for an air raid warden to examine. The arm bands did not appeal to us because we thought they might be in the way of an active worker, that they certainly would become rapidly soiled, and most important, that because of its bulk a man would not always have his arm band with him. We will, however, use arm bands for our laborers.

Mutual Aid Repair Trucks

Each water department in the County will make up their own repair crews in such manner as they deem best. Some may want to include common laborers for making the necessary excavations and performing other manual work. For Mutual Aid purposes, however, we have assumed that common labor would be supplied by the road repair or demolition crews as these two branches will have available a large reserve of labor and equipment and on water main repair work it is not always necessary to have laborers. We have a working agreement with the Lighting Company, Telephone Company and the Highway Departments that all available labor on the job, regardless of the particular utility it is responsible to, will do the work most needed on the site at the time.

We have asked thirteen municipalities to furnish a total of twenty completely equipped repair trucks with a crew of from two to three men each. We believe that at least for the present a reserve of this size is adequate for any situation that might arise. It would be possible, however, by virtually denuding the other municipalities to get an additional twenty crews. As each repair foreman has his own idea of the best way to make repairs and what material and equipment is needed, we have not prescribed what the truck shall carry. We are, however, sending out to the Water Superintendents a list suggesting the needed equipment.

Disinfection

To date we have done very little with respect to planning for the disinfection of broken water mains or emergency chlorination. There is no sense giving a pipe foreman or even most superintendents of the smaller systems directions for disinfecting mains using the words "residual," "parts per million" or similar terms. It is relatively easy to disinfect sections of new main; however, it is a more difficult job to disinfect after repairing a break.

We are fortunate that we have a County Health Department the Chief Sanitary Engineer of which is our Assistant Zone Coordinator, R. M. McLaughlin, on whose staff are three sanitary engineers. The services of these engineers will be available wherever there is a problem in emergency disinfection. There is also some thought of recruiting auxiliary personnel from such classes as high school chemistry teachers and others trained as chemists to assist in this particular work.

Protection Against Sabotage

We have given little advice to the different Water Superintendents with respect to protection against sabotage except to suggest that they keep visitors out of the plants, be more careful about locking doors and try to get more help from the local police. Nobody yet has come forth with any definite direction as to what should be done and the best answer seems to be for the superintendent to use his own good judgment. Some army officials have told us that we should place guards at all important points. Guards are expensive and our own officials say operating costs must be cut down to reduce local taxes in view of the increasing Federal taxes. Some committees have recommended floodlights and fencing. We find we cannot get the floodlights, and Harry Jordon, Secretary of A. W. W. A., in his very timely paper on "Too Much That Is Not Important" calls attention to the fact that if every water works utility fenced even one acre it would require 77,568 tons of high grade steel wire, a very critical material.

Cooperation with Other Agencies

The local fire departments, through their Fire Chief's Emergency Plan, even prior to Pearl Harbor, had in effect a smoothly functioning Mutual Aid setup. We are cooperating closely with this agency on such points as instruction to regular and auxiliary firemen on the necessity for closing hydrants slowly and limiting the waste of water during fires. We expect to work out jointly some method whereby, in the event of a series of fires that would tax the total capacity of the water system, advice could be given to the Fire Chief on the job by the Water Superintendent as to how much water is available to fight the particular fire. We have enjoyed very close cooperation from the county Defense Council and with their assistance have worked out our communication and identification methods, traffic routes for emergency repair trucks and other problems. Our cooperation with the Highway Departments has been somewhat facilitated by the fact that the author is also a Coordinator for that Mutual Aid Plan.

After several months of hard work (and the exercise of our powers of imagination) we have come to the conclusion that we must be doing either too much or too little, and that what we are doing may be all wrong, but this time we only hope that we never find out.

Water Leak and Waste Survey in Allentown, Pa., Exceptionally Profitable

290,000 G.P.D. Water Stealage Uncovered

In Allentown, Pa., pumpage records of 19,500,000 for the past year in contrast to 17,000,000 two years ago, and taking into consideration billed water, indicated that something unaccounted for was happening on the Allentown distribution system. So, The Pitometer Co. of New York City was employed to ferret out the reason in a leak and waste survey.

It was early learned in the survey that one of the "unaccounted for happenings" was a steal of 290,000 gallons daily through a fire service line into a single industrial plant.

In addition, only a partial survey of the system revealed underground main leakage amounting to 974,000 gals. per day, the total waste detected on one portion of the system being 1,345,000.

These results have warranted extension of the waste and leak survey, which to date has cost the city $3,300 to uncover wasted and stolen water with a value of $17,000 per year.

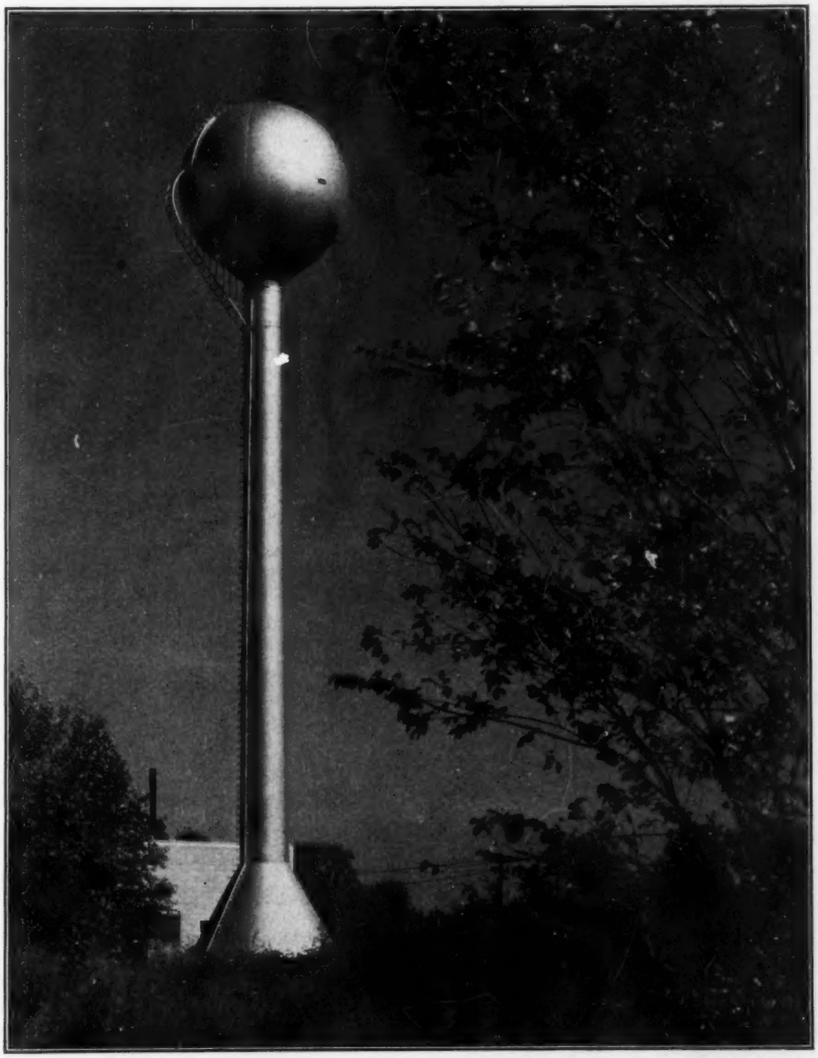
California Sewage Men Met at Bakersfield

About 100 members and guests attended a three-day Spring conference of the California Sewage Works Association at Bakersfield on April 26, 27 and 28.

U. S. Army officers from a number of neighboring posts and cantonments were in attendance, and the meeting was highlighted by addresses from the Federation's Secretary, W. H. Wisely, and the Chief of the Repairs and Utilities Branch, U. S. Corps of Engineers, Louis H. Kessler.

Commencing with the operators' round table discussion on the evening of Sunday, April 26, technical sessions continued through the meeting hours until noon of the 27th, when a caravan proceeded to the Minter Air Training Field, enjoyed lunch at the officers' mess, thence to an inspection of the Post's treatment plant, followed by a visit to the plants of Shafter, Wasco and Bakersfield. Mr. Wisely opened the session on Monday morning, and Mr. Kessler was the guest speaker at the convention's dinner on Monday evening.

The place and date for the fall meeting has not been determined.



(Photograph through courtesy of the Chicago Bridge & Iron Co., of Chicago.

Cowden's Watersphere

This picture is another bit of evidence that we have a penchant for artistic water works structures which may become constant reminders of the general public that there IS "Something Behind the Water Spigot"— something, 1440 minutes of the day, and every day.

This attractive utilitarian structure is the "Watersphere" of Cowden, Ill., which holds 50,000 gallons of ready to serve aqua pura atop its 100 foot tower.

CAN AMERICAN WATER SYSTEMS PROVIDE ADEQUATE CIVILIAN DEFENSE?

With Reference in Particular to Fire Service in the Vicinity of Fractured Mains Should Air Raids Come

By KENNETH J. CARL
ENGINEER*
THE NATIONAL BOARD OF FIRE UNDERWRITERS
NEW YORK CITY

Here is a paper of considerable interest to many a water-works operator and city official—and as reassuring as it is interesting.

It represents the first published analysis of what can be expected in the way of obtainable water volume and residual pressures in the vicinity of breaks, should our mains be ruptured by enemy bombs.

It was somewhat astounding to hear a representative of the Fire Underwriters state that even where mains of 6 to 8 inch size are completely ruptured in the average American distribution system one may expect to find an ample residual pressure for operating small hose streams in the attics of residences, for putting out fires started by incendiary bombs, as close to the main break as 500 ft. And, in the case of larger mains not more than 1,000 ft. from the break.

So impressive were the timely revelations in this paper, presented by Mr. Carl before the Maryland-Delaware Water and Sewerage Association in Hagerstown, Md., on May 7th, that permission for its prompt printing in "Water Works and Sewerage" was requested and granted by the Association.

Coming from The National Board of Fire Underwriters, the analysis and conclusion that American water supply systems are in general in a condition to "take it," should air raids come, is indeed reassuring.

SINCE the beginning of the severe bombardments which were inflicted by enemy aircraft upon a good many English cities about a year ago, many papers have been written in this country concerning water supply operations during periods of national emergency. These papers have dealt chiefly with the protection of water supply systems from injury as a result of sabotage or direct attack from the air, and have been based in a large degree upon reports received from England.

Little, if any, attempt has been made, however, to evaluate the characteristics by which American water supply systems differ from those of Europe with respect to their relative abilities to provide for Civilian Defense. Perhaps this has been due to the general lack of data upon which such an evaluation could be made. In the files of the National Board of Fire Underwriters are detailed studies and reports on the water supply systems of over 450 cities with populations of 25,000 and over. From an examination of some of this data and from information available on the water supply systems of Europe, and particularly England, let us determine whether or not our American systems can provide for Civilian Defense.

Wherein Our Systems Differ

In the first place, when we examine the systems in England we find as a general rule that fire protection had not been stressed in the original design or in subsequent improvement programs, with perhaps the exception of those which have been made recently as a result of the war and concerning which little is known. This fact is brought out by the following statement by Mr. John Bowman, City Water Engineer of Edinburgh, Scotland, and President of the Institution of Water Engineers.

"Generally it may be said that the main pipes in most towns are not adequate, except in the main streets, to supply water for fire extinguishing purposes."(1)

In our country the problem of providing enough water for fire protection in addition to the demands of consumption is one that is given important consideration by all consulting and operating water supply engineers. The standard grading schedule of the National Board of Fire Underwriters has been developed over a long period of years for the purpose of classifying our cities on the basis of their fire defenses and physical conditions. That portion of it which deals with water supply sets certain standards which have generally been accepted as good practice by engineers throughout the country. By making improvements in accordance with the principles outlined in the Board's schedule, many cities now possess systems adequate for domestic and general fire use and with a considerable degree of reliability in case of emergencies. As a result of this greater emphasis on fire protection, it can be said that our systems should generally be able to cope with the requirements of civilian defense in time of war better than those of England.

It is a well accepted fact that water consumption per capita in the United States is greater than in Europe. It can easily be seen that during and immediately after an air raid, domestic consumption would be low, leaving a greater portion of the capacity of the mains for civilian defense and fire department use. It then follows that in this country, where the mains are designed for larger consumption, this additional capacity available for emergency use will be greater than in Europe, where the mains are designed for small consumption.

From the experience of the English, it appears that little, if any, damage has been inflicted by the enemy on reservoir dams, pumping stations or other structures of the supply works. Whether this is due to a plan of enemy action or their inability to hit these structures we do not know. Harry E. Jordan, Secretary of the American Water Works Association, throws some light on the situation when he states the following:

"Overseas experience has indicated that well organized anti-aircraft defense can keep enemy planes flying so high that definite objectives in the defended area cannot easily be hit. In such case, air bombing becomes a random operation, and hits upon certain types of structures such as pumping stations, filters and mains become a matter of simple area-probability."(2)

W. W. Brush, editor of *Water*

*Field Engineer for the Committee on Fire Prevention and Engineering Standards.

Works Engineering, has written the following concerning the damage caused by air attacks:

"The damage may come from chance hits with mains suffering most because they occupy so much more of the attacked area than other vulnerable parts of the water system. While duplication and protection of essential parts of the supply system are desirable, the reports from England indicate that interference with water supply at the source and on its way to the distribution system has not been an important item in the water purveyor's problems."[3]

It is therefore reasonable to assume that should bombings occur on a large scale in this country, the damage that may be done to our supply works would be slight, but our distribution mains which are spread over wide areas would undoubtedly be damaged at various points. It is stated that with reasonable effective air defense, the breaks in water mains may develop at the rate of only one per hundred miles of mains per day.

During air attacks, small incendiary bombs, about which we all have heard a great deal, are dropped by the enemy in an attempt to start fires simultaneously in many places to cause confusion among the population and civil authorities, to destroy objectives by fire, and to improve the visibility of targets. Because of the multiplicity of these small fires, the extinguishment of most of them has been assigned to householders and local air raid wardens.

What It Takes to Combat Incendiary Bombs

Most literature and discussions on incendiary bombs have dealt with effective means of extinguishing the bomb itself and little has been said about the fires started by the bombs in combustible material. To extinguish fires involving the ordinary combustible materials found in most houses, the most effective agency is water. Sand or the other compounds which have been developed for the extinguishment of incendiary bombs cannot be used very effectively on a blazing curtain or upholstered chair. The problem which confronts us then is the most effective means of applying water to these fires in the home, remembering that in some cases it will have to be applied by women or children. In England the widespread use of the stirrup pump is well known to all. In addition to these, hand fire extinguishers and hand pump tanks have been recommended. At present we know that it is practically impossible to supply each home with any one of these appliances. But practically every home in the country has some garden hose, and if not it can still be purchased in most localities. If we can provide suitable outlets for the use of this hose within the house with an ordinary garden nozzle, we have an inexpensive and effective means of not only putting out fires caused by bombs, but also hastening the extinguishment of the bomb by the use of the fine spray adjustment of the nozzle. Faucets can be provided with garden hose screw threads and there are numerous patented adapters available at a nominal cost which may be used on ordinary faucets.

When a Main Is Broken—What?

The effective use of this hose depends upon the availability of water at suitable pressures during a bombing attack in which some injury to the distribution system may be sustained. If a main were broken during an air raid, the water utility would naturally take steps to shut it down as quickly as possible. We know that some time would elapse before the crew could be dispatched to the scene and the valves to be closed designated and located. In some instances this time may be very short, but in others, where emergency crews are not well organized and valve records are poor, it may be excessive. With a break of this type, the flow from each broken end would be considerable, and if the main is large, the difficulties of shutting down are evident. Assuming that the mains were designed and valved so that after the shutoff was made adequate quantities and pressures would still be available, it can be seen that enough time would elapse between the time of the break and the shutoff for small fires started by incendiary bombs to spread considerably unless properly extinguished. Let us see then whether or not our systems can deliver adequate quantities in most parts of our cities for small hose streams at suitable pressures during the time that a large flow may be gushing from both ends of a broken main.

Minimum Pressure Requirements

From experiments made with an ordinary garden nozzle attached to 50 feet of ¾-inch garden hose, it was found that a satisfactory stream of 3.5 gallons per minute, which would carry for distances up to 20 feet, could be obtained with a nozzle pressure of about 9 pounds. The pressure should be available about 3 feet above the attic floor. In the average two and one-half story dwelling this is about 25 feet above the street. Experiments recently made by Underwriters Laboratories, Inc.,[4] with 50-foot lengths of ¾-inch garden hose show that for a flow of 3.5 gallons a minute, the loss of head is only 2 feet. If we assume that the average length of service and house pipe to the point of hose connection is 100 feet, and that the average size of such piping is ¾ inch, the loss in them will be about 5 feet. Taking this combined loss of 7 feet and the 9 pound pressure required at the nozzle, 25 feet above street level, we find that a total pressure of about 23 pounds is necessary at the curb.

Distances from Breaks Before the 23 Pounds Is to Be Found

With this requirement in mind, we selected cities in various parts of the country and made studies based upon data in our files obtained on recent surveys. We selected a main near a point where we had previously made a fire flow test and considered it broken. We first estimated the flows from the broken ends, assuming them in most cases to be equal, and then obtained by the method of "trial and error" a total flow which would agree hydraulically with the conditions indicated by the test. The loss of head per 100 feet was then computed for the given flow, and using this slope it was possible to determine just how far away from the break the pressure would be the required minimum of 23 pounds. Since the fire flow tests made by the National Board of Fire Underwriters are located to give a representative analysis of the strength of the distribution system, it follows that any studies based on them should also indicate representative conditions.

In general it was found that breaks in 6 or 8-inch mains in areas where the gridiron and initial pressures are fair to good would only reduce pressures below those required for small streams in a limited area, such proving to be within a radius of about 500 feet. On larger mains the areas affected were naturally more extensive. However, in two far western cities and one New England city breaks in 12-inch mains, and in a southern city a break in a 16-inch main, would adversely affect areas only within a radius of not more than 1,000 feet—probably less. Coming closer to home, we find that mains up to 10-inch could be broken in Hagerstown, Md., with similar results. In Wilmington and Baltimore we can go as high as 16-inch and still find a 23 pound pres-

sure existing at not more than 1,000 feet from the rupture.

As an aid to the reader in quickly verifying these statements in a general way, two tables are presented. Table No. 1 indicates the quantities of water generally available at a residual pressure of 20 pounds as determined in 12 cities selected at random, except that this group includes the cities mentioned above. The maximum amounts are given for the principal mercantile districts. Table No. 2 shows the discharges from the ends of pipes of various sizes for velocity pressures of 1, 5 and 10 pounds and the friction losses produced in the pipe by the flows to the open ends. From study of Table 1 it can be seen that in the principal mercantile districts quantities of from 6900 to 39,000 g.p.m. could flow from a break without reducing the pressure below 20 pounds. In other words, with flows of these magnitudes we would have practically sufficient pressure almost immediately at the break to furnish the needed supply for putting out fires with garden hose streams. If the flows from the rupture were greater and the residual pressure be reduced below 10 pounds, we can find from Table No. 2 just how far back from the break a satisfactory pressure would exist. Take, for instance, the case of city No. 9 with a population of 275,000 and where a flow of 26,000 gallons was available at 20 pounds; if more hydrants had been opened and the pressure reduced to 5 pounds, a greater quantity, say 30,000 gallons, would be discharged. This could be assumed as 15,000 from each end of a broken pipe. This is about what you would get from a main 18 inches in size. Using Table No. 2 we find that the required pressure for small hose streams under these conditions will be available at

$$\frac{23.5}{3.8} = 4.75,$$

or 475 feet up the main from the break.

Table No. 1

Fire Flow in GPM Available at Residual Pressure 20 Pounds as Indicated by Tests Made by the National Board of Fire Underwriters in 12 Cities

No.	Population	Principal Mercantile District	Manufacturing Districts	Residential Districts
1.....	30,000	8,300	1,000- 1,300	900- 3,800
2.....	48,000	6,900	1,500- 4,900	2,400- 4,700
3.....	67,000	11,000	.....	1,000- 5,000
4.....	71,000	9,000	2,000- 8,000	1,000- 5,000
5.....	80,000	18,400	1,500-11,000	800- 4,000
6.....	105,000	14,200	4,000- 9,000	2,000-10,000
7.....	115,000	15,000	2,000-11,000	4,000- 7,000
8.....	180,000	11,300*	3,000- 5,000	1,000- 7,000
9.....	275,000	26,000	1,500- 5,000	1,000- 5,000
10.....	310,000	24,200	2,500- 7,000	1,500- 5,000
11.....	492,000	28,300	3,000-10,000	2,000- 6,000
12.....	800,000	39,000	5,000-17,000	Over 4,000

*With one 36-inch main out of service.

Table No. 2

Discharges From Ends of Pipes of Various Sizes for Several Velocity Pressures and Corresponding Friction Losses in Pipes.
(In computing flow from ends of broken pipes coef. = 0.70 was used; for friction losses C = 100 was assumed)

Size, In.	Velocity Pressure = 1 Lb. Discharge g.p.m.	Velocity Pressure = 1 Lb. Friction Loss Lbs. Per 100 Ft.	Velocity Pressure = 5 Lbs. Discharge g.p.m.	Velocity Pressure = 5 Lbs. Friction Loss Lbs. Per 100 Ft.	Velocity Pressure = 10 Lbs. Discharge g.p.m.	Velocity Pressure = 10 Lbs. Friction Loss Lbs. Per 100 Ft.
6.....	750	2.6	1,700	13.2	2,400	26.0
8.....	1,350	2.3	3,000	8.8	4,250	18.2
10.....	2,100	1.7	4,700	7.6	6,600	15.6
12.....	3,000	1.4	6,700	6.1	9,500	11.6
16.....	5,350	1.0	11,900	4.3	16,900	8.2
18.....	6,750	0.9	15,100	3.8	21,400	7.2
20.....	8,350	0.7	18,700	3.4	26,400	6.3
24.....	12,000	0.6	26,900	2.7	38,000	5.2

Note—For a pipe ruptured, with two ends flowing, the discharge may be double the above quantities.

Table No. 3

Gate Valve Shut Off Sections as Indicated in Reports of the National Board of Fire Underwriters on 12 American Cities.

No.	High Value Districts Average	High Value Districts Maximum	Residential Districts Average	Residential Districts Maximum	On Large Mains
1.....	960	....	1,590	....	835
2.....	340	....	700	....	....
3.....	450	980	540	....	2,350
4.....	780	....	910	....	1,700
5.....	435	1,800	880	2,200	....
6.....	380	900	355	750	525
7.....	500	....	480	....	....
8.....	880	1,600	990	2,580	1,760
9.....	650	....	770	....	1,510
10.....	560	....	1,030	....	....
11.....	540	2,000	1,080	....	....
12.....	460	....	490	....	1,000

A Reassuring Circumstance

Of course, we know that there will be places in any system where this will not hold true, but the fact that it is true in many places indicates that our systems are in general well equipped to provide for civilian defense—a gratifying circumstance. Another point to bear in mind is the fact that the greater part of our systems are 6 and 8-inch pipe on which the bad effects of breaks are less severe. It should be pointed out that if a break occurs at a low point in a city, the high areas will naturally be affected, but in most cities separate services have been provided for the high areas, with separate distributing storage. Hence, on these high services a practically normal supply would be available even if a large downtown main is blasted.

The All Important Matter of Adequate Valving

All reports from England point out the necessity of an adequate number of well distributed gate valves to make shut-off lengths as short as possible. Most American systems are much better equipped with gate valves than those in other countries. Many of them have installed their valves in accordance with the requirements of the National Board of Fire Underwriters, which call for shut-off sections not in excess of 500 feet in high value districts or 800 feet in residential districts. Table No. 3 shows the average, and in some cases the maximum, shut-off lengths for the 12 cities covered in Table No. 1. While it can be seen that about half of the cities listed do not satisfy these requirements, the shut-off lengths are such that relatively small sections of the distribution system will be affected by a break.

The speed with which a shut-off can be effected is of considerable importance in operations during an attack and generally, with all other

factors equal, it will depend upon the number of valves to be closed. Three representative cities were selected and a study made of the shut-off lengths in the principal mercantile districts. Out of 142 lengths, 68 could be effected by operating 2 valves, 30 of them by 3 valves, and 31 by 4 valves; the remaining 14 lengths required from 5 to 8 valves. Thus it can be seen that in most cases it is only necessary to operate a few valves to shut off sections of mains which may be damaged, and the resultant speed of these operations not only aids in maintaining a more satisfactory supply for fire fighting in the city, but also enables the water department to accomplish more work with a smaller force of men.

The Matter of Hydrants

Hydrant size and distribution are other factors which are important in defense against the large fires which are usually started during most air attacks. In England many of the hydrants in service are much too small, while in this country most cities have hydrants of good size and well designed for fire service. It has been proven by experience that hydrant installations should be on the basis of the area served rather than linear spacing along streets, and the requirements of the National Board of Fire Underwriters have been formulated on this basis. The area to be served by a single hydrant is determined by the fire flow required in the district under consideration. In the three cities in which we considered the gate valve shut-off lengths, we find in the principal mercantile districts that the areas served by each hydrant are, respectively, 44,000, 54,000 and 68,000 square feet. The resultant spacing along the main streets are, respectively, 160 to 200, 160 to 180, and 180 to 260 feet. Another interesting fact is that in these areas, of the 103 gate valve shut-off lengths which affect hydrant supply, 44 will put one hydrant, 30 two hydrants, and 11 three hydrants out of service; the remaining 18 lengths, mainly all in one city, affect from four to nine hydrants each. In residential districts the distribution of hydrants is less concentrated, but considering the lack of congestion and the activities of the civilian defense units, it will be generally adequate to handle the fires which may require the services of the fire department. Hence it can be seen that hydrant installations in this country are generally well adapted for fighting fires during air raid attacks.

Perhaps some of you have been wondering just what would occur if a supply main were hit and put out of service. In our files we have an excellent example which occurred during the flood of 1936. The city in question is supplied by gravity from six impounding reservoirs through four normally throttled supply mains from three directions. During the flood a 24-inch line was washed out and could not be shut off due to the height of the flood waters for 12 hours. By proper manipulation of the valves on the remaining lines, pressures were so regulated that the minimum reached in the principal mercantile district was 45 pounds and only 1 per cent of the consumers were without water at any time. This shows much more clearly than any computations what can be accomplished during an emergency with a strong water system.

From the facts we have discussed I believe that we can conclude, assuming in accordance with the reports from England, that our supply works and supply mains will not in general be seriously damaged, that due to the strength of our distribution systems, designed for substantial fire flows as well as domestic consumption, and the generally adequate number and proper distribution of gate valves and hydrants, our American water systems can, in general, provide adequate civilian defense.

References

(1) Bowman, J. "British Water Works Practice," Jour. N.E.W.W. 53:4:394, Dec., 1939.

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Single Stage "Bio-Filters" Give Efficiencies of 70 to 85%

In our April issue in a report by E, F. Eldridge, of the Michigan Engineering Experiment Station, covering the recent meeting of the Michigan Sewage Works Association, Dr. A. J. Fischer of the Dorr Co. is credited as having stated in his paper that "single stage 'bio-filters' give overages of 60 to 65 per cent removals of B.O.D.," and that two-stage filters give 85 per cent or better removals. However, the 60 to 65 per cent removals for single-stage units is in error. The figures should have been 70 to 85 per cent.

Mr. Eldridge has requested that the correction be printed and writes as follows:

"Through some inadvertency the efficiencies given for single stage 'bio-filters,' in my report of the Michigan Sewage Works Association meeting, on page 159 of your April issue, are in error. The 60 to 65 per cent efficiency, which the report stated as being given by Dr. Fischer, should have been 70 to 85 per cent."

Fred Hartmann Now Captain U. S. Engineers

F. W. Hartmann

Fred W. Hartmann, Assistant Manager of the Chicago district for Pittsburgh-National Meters, has been given leave of absence by his company for the duration so that he might serve with the armed forces of the country.

On May 7th he received the commission of Captain of Engineers, U. S. Army Corps of Engineers.

Fred has long been a "wheelhorse" in the Illinois Section of A. W. W. A., of which he was elected vice-chairman in 1941 and in line for the chairmanship this year. Best of luck to you, Fred, and keep that "shootin' pistol" in good working order, 'cause we need you back again, you know.

Sewage Works Operator Heads Water Operators' Conference

When a group of water works operators selects as their chairman a strictly sewage works operator, that makes news. Nevertheless, such was the case in the recently established "Erie-Niagara Water Operators' Conference" of Western New York.

When this group organized, a live-wire operator was sought to serve as its first chairman. In looking about they lit on a live-wire operator all right, but this operator proved to be strictly a sewage works man—"Doc" George Symons, Chief Chemist for the Sewerage Authority of Buffalo. However, "Doc" was raised up as a "water boy" and worked for his Dad in the Danville, Ill., filter plant.

Ralph Bates, District Engr., New York State Dept. of Health, was chosen secretary of the Conference, which has held one meeting, featuring defense preparation and the mutual aid plan of New York State.

ARIZONA ASSOCIATION MEETS IN TUCSON

Devoting Two Days to Wartime Considerations in Water Works and Sewerage Operation

A Report by
A. M. RAWN*
Associate Editor
LOS ANGELES

KEY-NOTING their '42 Spring meeting with "War and Rumors of War" some fifty members of the Arizona Sewage and Water Works Association met in Tucson April 10 and 11 for a two-day session on the Campus of the University of Arizona, and in the "eating and talking rooms" of the Pioneer Hotel. University officials not only loaned campus facilities for the meeting, but lent their good offices in providing speakers at three of the group luncheons and dinners. The meeting followed a four-day Short Course in the University of Arizona held for, and attended by, twenty-three sewage and water works plant operators.

Officers

The President—Guy Rhodes, Supt. of Public Utilities; Secy.-Treas.—Richard Bennett, Engr., Phoenix Water Dept.; Incoming President—Herbert Idle, Globe, Ariz.; New Vice-President—Prof. E. S. Borquist, Univ. of Arizona, Tucson.

Opening Friday morning with a business and technical session, members adjourned to meet at luncheon and listened to an address by Engineering Dean Butler descriptive of the University's activities and training personnel for the present war. Followed then the afternoon program studded with war preparations and warnings, after which Doctor Alfred Atkinson, guest speaker at the Friday dinner, described the meaning of what is going on in the world. He stated, in part, that nations are now catching up with what engineers and other scientists have created. Science has transformed America and the world, and this war is the birth pain of a new era—a new way of life, organized along lines dictated by modern engineering in all of its phases. The war, he said, is being fought to decide who will do the reorganizing; who, in fact, will sit at the council table when the new rules are written. His remarks were thoughtful and analytical—but not too hopeful. He implied that force alone cannot settle this or any other world perplexity, and that final settlement will be postponed from time to time—from war to war—until some influence other than command of arms and weapons dictate its terms.

Again on Saturday morning the technical session, highlighted by Major G. E. Arnold's Water-Works coordination plan, was colored by war effort; while at luncheon, University of Arizona's Dr. Hubbard "de-bunked" the idealist's conception of the growth of Democracy through the centuries. He pictured how, since the early absolute monarchs of England made their first overtures to the common people, every concession to rule by the governed has been an expediency resorted to by a threatened ruler or ruling class. Doctor Hubbard stopped just short of the present conflict, but it was not difficult to envision the concessions which must shortly be made by those who have ruled the colored races in the South Pacific to such of those races as are their allies when the terms of settlement are made.

Saturday afternoon was devoted entirely to the customary Round Table*, while the session wound up with a bang at a Saturday night "baile" in the American Legion Hall.

Officers Elected:

The following officers were elected for the coming year:

President
Herbert Idle
Globe

1st Vice-President
Prof. E. S. Borquist
University of Arizona
Tucson

2nd Vice-President
George W. Marx
State Sanitary Engineer
Phoenix

Sec'y-Treasurer
Richard Bennett
Engineer, Water Department
Phoenix

The place of the Fall meeting was not determined.

"Effluent Disposal by Broad Irrigation" by John Rauscher, Office Engineer, Water & Sewage Departments, Tucson, Arizona.

The author stated, in part, that in 1926 the city constructed its first sewage treatment works designed on the principle of separate sludge digestion and the use of plant effluent for irrigation. The plant was designed for a flow of 3 m.g.d. and cost originally $72,000.00. In order to prevent odors, the City of Tucson in 1935 commenced treatment of the sewage with ferrous chloride produced from chlorine and scrap iron, this being the first plant of its kind in Arizona. The present chlorine consumption approximates 5 tons per month. Effluent from the plant is used to irrigate a 1300 acre city farm, and while the farm is not self-supporting (annual expenditures approximately $19,000 and receipts $8,400) the disposal method is deemed adequate and the over-all cost reasonable.

Years of experience have revealed

*Chief Engineer and General Manager, Los Angeles County Sanitation Districts.

*Presided over by A. M. Rawn who, through modesty, failed to so state.—Ed.

Geo. W. Marx, State San. Engr.
Phoenix, Ariz.
(Elected Vice-President by A. S. W. A.)

Phillip Shaw, President
Arizona Edison Co.

Major G. E. Arnold, Regional San. Engr.
9th Civilian Defense Area
San Francisco

Wm. J. O'Connell, Jr.
Technical Consultant
Wallace & Tiernan Co., San Francisco

Alice Mathis, Chemist
Phoenix Sewage Treatment Works

Corporal Kenneth Jacobsen
Luke Field, Ariz.

that barley and oats planted in October and harvested in May, and Hegari ensilage planted in June and cut in September, are the most suitable crops. Cotton culture on this farm is unsuccessful because it is impossible to give the cotton the long drying periods required; also, since the fields must be ploughed once every year, the raising of alfalfa hay can not be practiced effectively. The Health Department will not permit pasturage of cattle on sewage irrigated land, but place no restrictions upon the sale of hay after it had been cured.

The plant is now overloaded, largely due to military activities, and there is a pending plan for enlargement to 5 m.g.d.

"Civilian Defense Coordination in Arizona" by Major-General Alexander M. Tuthill, State Director of Civilian Defense Field Activities.

General Tuthill stated that in the Office of Civilian Defense there are thirteen departments, all of which he enumerated; that it was not easy to block off any one of the thirteen because all were inter-related. He said that water works and sewage plant operators had a definite obligation to perform in time of disaster to keep their services adequate and in order. Also he asked all present to help rouse public interest in Civilian Defense. He stated that there was little interest in his department among the officials of Arizona, largely because the latter could not conceive of Arizona being in the potential combat zone. This is not the case, he insisted, stating that the southern portion of Arizona is as vulnerable as Southern California and that air raids are probable. Asked what the present status of civilian defense in Arizona was, he replied with the story of Uncle Billy who, having been sent to Congress, returned, and when asked what he had learned stated that he had learned some new words and phrases, one of which he liked a great deal was called "status quo." He said it described much of the condition in the Congress. Asked to define the term, he said that so far as he knew it meant "in a hell of a fix." The General urged the members to accept their full responsibility during the emergency.

"Interconnection of Water Systems" by J. B. Sanders, Manager Home Water Company, Tucson, Arizona.

Mr. Sanders' plea was for the authority for small water companies which furnish supplies to subdivisions in the environs of the larger cities, to connect or to be allowed an emergency connection with the city's system during the National emergency, in order that the suburban area might not find itself without water in a critical time. He stated that since the automobile has allowed the wide dispersion of forces and of settlement, it has followed logically that many build their homes well beyond the termini of the municipal utilities; that the cities could not economically serve the outlier; therefore, the subdivider has necessarily had to arrange for water supply privately. He urged cooperation between the large and small systems for mutual benefit, but stated that he was particularly anxious to secure for the small owner the benefit of the city's more uniform supply. Concluding, he directed attention to the fact that dangers connected with pollution from the outside system are greatly minimized if a connection itself is provided with double check valves as is the case in San Francisco.

Commenting, Major G. E. Arnold, former sanitary engineer and chemist of the San Francisco Water Department, stated that he believed the danger of pollution entering the San Francisco water system through connections to outside water sources had been reduced to a 1% probability, if that, with the regularly inspected double check valve system.

"Interconnections — Public Health Viewpoint" by George Marx, Director, Sanitary Engineering Division, Arizona State Board of Health.

Mr. Marks first described what his department terms a cross-connection. He stated that it was a connection between potable and nonpotable water—not a connection which admitted possibility of contamination from sewage and waste. He cited an example by stating that a connection to an emergency or a regularly-operated private supply used for bottle washing (not chlorinated or sterile but otherwise all right) might be termed a cross-connection of the type being considered in his discussion. He pointed to thirty-three (33) outbreaks of water-borne diseases throughout the United States and Canada in the 1930's due to cross-connections, but said that health hazards might of necessity have to be tolerated during the emergency in view of other benefits to be derived from inter-connections. He advised those who would permit cross-connection to the city supply to investigate the history of the system to be connected and thereby minimize the danger to the more permanent institution. He directed attention to the lack of plumbing inspection in suburban areas; said that much of the danger in the connecting line might be avoided if emergency chlorination equipment were on hand and everything was ready to put it into use on short notice.

"Civilian Defense Applied to Water

Works" by Philip Shaw, President, Arizona Edison Co.

Mr. Shaw stated that every generation appears to think its problems more serious than those which have preceded it. He said that there was the same feeling of disappointment in the last war over the lack of interest in civilian defense, as in this one. His position in the defense scheme, he said, was to direct activity looking to the protection of a coordinated water supply; that he believed in a time of crisis many citizens would move inland to parts of Arizona which are more readily, or easily, defended than are some of the Pacific Coast centers, and that water service at that time would assume an even greater importance in the state's economy than at present. He said, as to Arizona, in the northern part of the state they might anticipate the influx of refugees; in the central portion, both refugees and possibilities of bombings; and in the southern—or critical areas—bombing raids; that sabotage was to be guarded against at all times in all three. He advised preparation of extensive maps of all water systems for which there would most surely be a request from the zone water coordinator. He urged familiarizing assistants with location of shut-offs. He said it would be impossible for all water systems to get all of the equipment they desired for any conceivable emergency; that an exchange of inventory lists and a cooperative spirit among those charged with water distribution would be of value in event of disaster. His final word of warning was of a feeling current among the nation's leaders that 1943 might be too late to win the war—that 1942 was the critical year.

"Sewage Disposal in the War Emergency" by A. M. Rawn, Chief Engineer and General Manager, County Sanitation Districts of Los Angeles County, Los Angeles, California.

The speaker enumerated the factors which enter into the design of cantonment sewerage, systems and treatment plants. He said that wherever possible state health laws were rigidly observed and the approval of state health authorities sought preliminary to plant construction. Discussing the types of sewage disposal selected for cantonments, Mr. Rawn stated that the high capacity filters had entered the picture as complete treatment works more because of their lower construction cost than for any other reason. He made comparisons between the construction and operation costs of low and high capacity filters and activated sludge.

C. S. Beck, State Corporation Commission, Phoenix; A. L. Roberts, Supt. of Water, Globe; I. F. Brown, Supt. Water Works and Sewerage, Williams; A. A. Hartwell, Asst. Supt. Water and Sewerage, Glendale

Cantonment sewage treatment plants, he said, were presumed to have a 5-year life and comparisons of construction and of operation and maintenance were based upon this interval of time. Flows of sewage vary widely in different localities, but the over-all strengths per capita are about the same in cantonments of similar character.

"The Public Works Reserve" by Alfred G. Norris, State Director of P.W.R. for Arizona.

Mr. Norris said that before the war ended it was expected thirty million American citizens would be engaged directly in defense work, and thirty million in other lines of endeavor; that when the war ended it was expected that most of the thirty million war workers would need to be absorbed again into more peaceful pursuits; that for the period of readjustment far - sighted planners were attempting to build up a reserve of needful public works which would be ready for construction immediately upon cessation of industrial war production. It was the intent that those who would be thrown out of employment could be temporarily taken care of in useful construction work. He stated that this was not a WPA plan—neither had it been proposed for government financing, rather that it had as an inspiration the promotion of useful public work immediately war ceased, and the establishment of an orderly and economically sound 5- or 6-year perpetual planning program in which projects are to be arranged year by year in some order of priority.

[Since Mr. Norris' discussion it is known that Public Works Reserve has again been absorbed into the National Resources Planning Board.—A. M. R.]

"Ninth Civilian Defense Water Coordinating Program" by Major G. E. Arnold, Regional Sanitary Engineer, O.C.D., San Francisco.

Three divisions of this project, Major Arnold said, were:

1. Mutual aid plan.
2. Evacuation plan.
3. Protection of utilities against subversive action.

He continued that a state water coordinator was appointed in each state in the Zone, who, for Arizona, was State Sanitary Engineer George Marx. The Mutual Aid Plan, originated from experience in the east in hurricanes and floods, etc., had been adapted to use in the present emergency. The state was zoned geographically and politically. The zones were subdivided into districts—each of which might be a county or a group of communities, and each with a local coordinator, who, it was suggested, might be the superintendent of the largest water service therein. The district, he stated, was the operating unit and in it the local coordinators should prepare a list of all emergency materials, personnel, supplies and equipment. Make the list simple and have it on hand as a reservoir for emergency. Interconnections with other systems should be encouraged. Under the law, he said, the State Coordinator should be endowed with authority to secure the lists and utilize the emergency supplies in emergencies, and therefore state and local laws should be scrutinized carefully so that provisions might be made in advance for authority. Inventories, he said, should go beyond ordinary small municipal supplies and equipment and should include those held by contractors in the area. The whole plan should tie into the program of the State Defense Council.

Major Arnold then touched briefly on the preliminary plans for evacuation should it become necessary, and spoke of the difficulties which might attend such action. In reply to a query, he said that the London water system averaged one break per mile during bombing.

The Association endorsed Major Arnold's plan and officially adopted a resolution to the State Governor urging immediate adoption of the coordinated water program and legislation to put it in force.

REPAIRS IN THE SMALL WATER WORKS*

GUY A. RHOADS
Manager of Municipal Utilities
SAFFORD, ARIZONA

IN THE year 1785 a small water distribution system was built in what was then little more than a village, the town of Bethlehem, Pennsylvania. A short time after that notable occasion, a knot in the hollowed log pipe came out and the first repair job was under way in America's earliest small water works.

Much more than just water came from that knot hole. From that job there has come down to us a great tradition. It is a tradition of which we are all proud; it is the code of the American water works repair men. Today, there are thousands of small water works serving the people in every corner of the nation, and an army of repair men devote their time and labor to their maintenance. Innumerable repair jobs are now done every day, and, in like measure, from that first repair on the log pipe, the tradition has grown. It is the pride of water works men everywhere that water service should always be maintained with the least possible interruption and inconvenience to the public; it is their code that *"Water Service Must Not Fail!"*

The part these men play is an important one. Their work is indispensable to the well being of millions of people. Without it, the arts and industry of thousands of towns and communities would be disrupted; yet it is a difficult subject of which to write, to discuss in a coherent manner the myriad details that make up the daily work of our small water works repair men. Repair practices of the larger systems lend themselves more readily to consideration and have been frequently and ably discussed by competent writers, but they have left the small water works rather definitely to "root for itself."

It may be that repair practices can better be developed by following their example, and discuss water works repairs generally, rather than attempt to exclude that which does not pertain strictly to small systems. Keeping the small water works in mind, it may be possible to derive some applications that will be pertinent to the subject as stated, and to repair problems that are peculiar to small water systems.

Any attempt to analyze and outline the subject immediately raises some questions that are relevant in the way of an introduction. A brief consideration of these questions will assist in defining and limiting the subject, offer an explanation of points that are not entirely clear, and provide a convenient spring-board from which to plunge into the real theme.

*This paper was read before the Arizona Water and Sewage Works Ass'n, of which the author is immediate past president.

The Author

Repairs vs. Maintenance

What are repairs? How do repairs differ from maintenance in water works practice? The New Webster's Dictionary says that repairs means, "Restoration to sound or good condition after decay, injury, or partial destruction." This definition might also adequately cover the accepted meaning of the term "maintenance." However, by custom or usage, water works men have become inclined to separate meanings for the two terms. In trade language, "repair" is generally used when referring to fixing something after it becomes unfit for further use; "maintenance" means keeping it in good condition before it fails. To paraphrase, it might be said, "A stitch of maintenance may save nine stitches of repair."

Frequently, the dividing line all but disappears and work planned in a maintenance schedule becomes an immediate repair job, because of premature failure; or, on the other hand a repair job, properly prepared for and properly carried out, becomes a satisfactory substitute for work that would have been included in the planning of maintenance. For the purpose of this discussion no distinction in definitions of the two words will be made, and all restoration work will be considered as repairs.

This Discussion Will Hinge on Two Questions

What is the distinction between small water works and large water works? Why do repairs in the small systems differ from repairs in the large systems? When these two questions have been answered this discussion will have been finished, because these differences constitute the reason for the separation implied in the subject. Such basic differences will be considered briefly by way of introduction, and elaborated more fully in the discussion to follow.

No positive demarcation between small and large water works is possible. The difference is always relative and is determined by the individual viewpoint, or arbitrary comparisons influenced by local factors. The Phoenix water works, when compared with the New York City water system, is not very large, especially from the New Yorker's viewpoint. We think Phoenix has a large water works when we compare it with that of Safford. As a usual thing with us in Arizona, when the service meters exceed a couple of thousand or so, it is no longer a small water works. Of course, much larger systems must be kept in mind throughout the discussion when mention is made of large water works in repair work comparisons.

Why should repair procedure in water works having from a few hundred to one or two thousand services differ essentially from repair work in systems having many thousands? The answer is, of course, mostly a matter of economics. Investment returns and available funds are about as closely knit with volume in water works as in other lines of industry and are usually the predisposing causes for the methods employed in operation and maintenance.

As the large manufacturing plant, with its great installation of expensive machinery and equipment, its long assembly lines, and its huge volume of work, can produce an article more cheaply and perhaps better than the one man "roadside" shop, so the large water works with men specially trained in particular lines of work, provided with all necessary tools and equipment, and with an unlimited assortment of supplies and materials, can standardize its repair work with all the resulting speed, efficiency and economy. The small water works, its men swamped with over-lapping duties, provided with inadequate tools and equipment, with only a meager choice of materials and supplies, must, of necessity, suit the job to the occasion and handle its repairs in a more or less individualistic manner.

This does not imply that preparation and procedure planning are not as important in small water works repairs as in the large systems. It does explain why there is an inherent and distinctive difference in their repair methods. It explains why the repair section of water works bibliography is devoted almost wholly to methods and procedure as practised in the large systems, and is correspondingly silent in regard to small water works. One can not write an article or a book describing the repair work and methods of thousands of small water works when they individually follow their own, and often unique, methods. If any real effort has been made to congregate and correlate in a comprehensive and systematic

manner the various methods and practices employed in small water works repair, it has not come to our notice.

This apparently complete neglect of small water works repair problems is not altogether true for there is really a wealth of published information that will prove most valuable to the small plant repair man, if he can have it availabe when he needs it. The problem of acquiring this information in usable form leads to the first part of the actual discussion of the subject.

Repair Practice Divides Into Three Parts

The subject of repairs in water works, both large and small, seems to logically divide into three parts, which may be designated, "Repair Preparation," "Repair Procedure," and "Repair Records." The size of the system is not material to such a division for the smallest water works is as vitally concerned in all three parts as is the largest system in the country.

Repair Preparation

Under "Repair Preparation" three components are involved, personnel, equipment and materials. Any battle is half won if proper preparation is made and the place for water works repair men to begin their preparation is with themselves. The way to do it is by education and that may be acquired in two ways, experience and study. Experience can be gained only as opportunity provides, but study and observation are limited by nothing except the will, ambition and industry of the individual. This statement is not qualified because in this day and age no man who rates a position as water works repair man is so handicapped, financially or otherwise, that he cannot, if he so wills, acquire a practical education in his line of work.

As mentioned in the introductory section, a wealth of information is available, but, for the small water works man it must be searched out. By this it is not meant that complete instructions have been written to cover every eventuality the repair man may encounter. He will, if long in a small plant, have problems that are original, he will meet situations that are unique and for which no one has cataloged the exact procedure. In most cases, however, some one else has met and solved the same problems and has overcome the same baffling situations, and often an account has somewhere been recorded. (We would inject that the small water works man is usually too busy to do much recording—which includes the writing of articles.—Ed.)

Water works text books and reference works, while primarily concerned with the problems of larger plants, contain much of value for the small plant. The various trade journals have ideas and repair instructions in nearly every issue that will help the little fellow in his work. Catalogs and house organs are a mine of information for the repair man who will study them. Technical papers and discussions, such as will be presented here and at other meetings of this association, frequently furnish just the information he will need in some future job. The combined knowledge of repair men in small water works all over the country is ready to serve him, but, if he wants it, he must search for it. It is too bad that it is not to be found in any one book or set of books; it is hidden in many sources and requires industry and energy to dig it out.

Finding the information is only part of the task for it becomes useless unless it can be remembered or some means has been devised to find it when the need arises. Most small plant repair men are far too burdened to devote the time and concentrated thought necessary to permanently store in their minds all the knowledge of detailed methods and procedure their work will require, nor do they usually have time to make an extended search for the information at the time they need it, especially if it be an emergency. To be prepared for their jobs, repair men must have their knowledge ready when the job is ready. Can they do it? The answer is, "YES."

A thorough and complete education infers that one knows the answers, that in one's own mind the information is fully recorded, classified and arranged; a practical education requires only that one knows where to find the information needed and how to use it. This statement may not accord with the principles of pedagogy but the water works repair man who acquires such a practical education has made a long stride towards full preparedness for his job. There are many ways by which the busy man can keep the knowledge he finds available until he needs it. The important thing is to select one of the methods and follow it through.

Many find the indexed card system to be preferable. It is flexible, may be easily expanded, and is simple to maintain. All one really has to do is record on cards with appropriate headings the references that will readily locate pertinent information he runs across in his daily reading. It goes without saying, that if a man has the will and ambition to learn, he will read and study everything he can lay his hands on that has a bearing on his work. With some shelves to store books, magazines and catalogs, some boxes or files to receive pamphlets and circulars, it is surprising how fast such a storehouse of knowledge will grow if a few minutes each day are devoted to education and preparation for the work that lies ahead. The details of study may be forgotten, but they are there, filed away and ready at a minute's notice to give all the information necessary to do the job properly.

Another important part of the repair man's preparation is to study the system he is to maintain. By observation and study of maps and records he should thoroughly acquaint himself with all the physical details of his particular water works. A lost valve may prove very embarrassing when catastrophe has already overtaken him. In our own experience we know of an instance where a six inch distribution main was installed, covered up and forgotten. Not a soul of the crew, at the time we mention, knew it was there and the day came when an emergency repair made it necessary to shut off the water in that part of the city. All the known valves were finally located and closed, but the water pressure continued unabated, and no one knew why. Before the main was finally "discovered" there were a number of magenta-hued faces in the water works force. Perhaps you, too, have witnessed similar instances of life's embarrassing moments because some one had not properly prepared himself for his job. Wasted time and effort constitute a serious matter in emergency repair work and much of it could be avoided if every repair man's preparation included a thorough knowledge of his water system. The large water works are so organized that they usually have little trouble from this source but there is room for decided improvement in many of the smaller systems.

Planning Repair Work

Planning repair work is another part of the preparedness program. Most repair work can be anticipated if it is given consideration at the proper time, and better and cheaper repairs will result if the work is carefuly planned in advance. Schedules should be worked out to cover future repairs, in which the tools, equipment, materials and methods are indicated. To do this intelligently requires a complete knowledge of the condition of the water system and all its accessories and the ability to correctly estimate the repair work to be done. It is all a matter of preparedness.

Because it is usually handicapped by a lack of proper tools and equipment for some kinds of work and by a limited choice of repair materials, the planning of repair work in the small water works is governed by what is available to do the work. The repair man may urge that he needs special tools and equipment just as badly as the man in the large system. The management will find it hard to justify large expenditures for such tools and equipment that may be used infrequently. The result is usually a compromise between necessity and economy and the repair man must plan his work accordingly.

Frequently the small system can, in effect, augment its own tools and equipment by reciprocal understandings with the mechanical departments of other companies in the community. Many shops and factories, in no way related to water works, have tools and equip-

ment that are well adapted to small water works repair jobs. This is not intended to advocate a "lease-lend" program as a favored policy. It is only suggested that the prepared repair man will know what is available and where, when his own resources prove inadequate.

Regardless of how much or little a repair man may have in the way of tools and equipment, if he would be prepared, he will have them always in good condition and ready for use. He will have his supplies stored in an orderly manner so he knows exactly where to lay his hands on them when needed. Preparation is half the battle and the repair man can safely measure the success he may expect in the other half by the preparation he has made for his work.

Repair Procedure

By "Repair Procedure" is meant the processes and methods involved in repair work, the actual operations of the repair man in the day by day maintenance of a water works. An attempt to follow an outline in this portion of the subject would divide it into "Planned Repairs and Emergency Repairs," "Temporary Repairs and Permanent Repairs," "Individual Repairs and Standardized Repairs," with further subdivisions according to the several parts of the water system. Such a discussion would extend this paper much beyond the length allotted, and, after all, planned repairs are generally what were defined as maintenance, and emergency repairs are usually made after failure occurs or appears immediately inevitable. Temporary repairs are only compulsory or advisable substitutes for permanent repairs or replacements to follow. All are a part of every water works repair program but these classifications do not, of themselves, indicate any separation of small water works problems from those of the large systems.

By "Individual Repairs," however, is indicated the specific repairs of a particular water-works as compared with standardized repairs, which are the repair methods and practices that are substantially common to many water-works. Generally speaking, it may be said that the former are characteristic of the small water-works and the latter are employed by the large systems. Each may encroach upon the other, but the individuality of the repair work in the small water system is usually much more pronounced than in a larger system.

Every part of a water system, whether large or small, is subject to decay, injury or some kind of destructive influence that, sooner or later, will require repair work. If a start is made at the source of supply with the dams, head works, intakes, pumping plants, collection galleries and reservoirs, and the water followed through transmission lines to purification, corrosion, taste, and odor control equipment, softening plants, and filter plants; up in stand pipes and elevated tanks; down to fire lines and hydrants, distribution mains, service pipes and meter equipment; in valves, pipes and fittings, every step of the way, evidences of future repair work to be done will be noted. Dilapidation is inevitable and, while the small water-works may not have so many parts with such diversified possibilities for trouble as the large system, every one from the smallest up is beset with repair problems, numerous and never ending. In each case the repair procedure is determined by the preparation and availability of knowledge, skill, tools, equipment, materials, and supplies.

The large water-works, because of the great volume of repair work they continually have, are able to divide their work according to types and assign the work to crews of men specially trained for the particular work they do, each man skilled in doing certain jobs with speed and dexterity. They must have proper tools and equipment adapted to each kind of work and there must be continually available the parts, materials, and supplies required or best suited for each type of repair. If they did not have these things with organized crews of expert repair men, they would soon be lost in confusion and buried in inefficiency. They do have them because the amount of work they do makes it imperative and the great number of people they serve justifies it. Having them, they are able to follow standardized methods for nearly all their repairs; and, can plan their work with the foreknowledge that from the combined experience of many water systems there has been evolved the best possible procedure.

The small water-works, with only intermittent repair work of any one kind and serving relatively few people, is not in such favorable circumstances. Segregation of repair work to specialized crews is usually out of the question; every man must do many different kinds of work, sometimes not only every kind of repair work but operation and installation as well. The small plants usually have only limited working funds to cover many needs and seldom can they have all the tools and equipment they need. The same, of course, is true of materials and supplies. Furthermore, there is not much consistency in what they do have. Tools that are considered absolutely essential in one small plant are not to be found in the next one, and this one may be doing its work with equipment that the other one does not have. It is obvious that it would be difficult for a small water-works to adhere to any fixed procedure in its repair work and practically impossible for any number of such systems to follow the same set of standardized methods.

The Factor of Individual Adaptability

Individuality is a great thing. People and nations fight for the privilege of exercising it. But standardization is also a great thing in this present day, busy world. The large water systems unquestionably have the advantage over the small plants in repair work, as elsewhere. But this does not mean that the small water-works do not get the job done, for they certainly do. There are few breeds of men who excel the small water-works repair men in resourcefulness, ingenuity, versatility, and all around ability. They are a self-reliant, capable bunch of men, and the work they do generally requires no apology.

This praise should be modified with the admission that there are some jobs which the large system repair man can do with a perfection that the small system man cannot even approach. It is agreed that anything to be properly repaired must be restored to required accuracy and renewed serviceability and durability, otherwise it is a poor job, and that is about as bad as no job at all. If, because of lack of knowledge, skill, equipment, or materials, a repair man is unable to do a job in an acceptable manner, it should be his policy to have it done by some one who is qualified and able to do it properly.

On Being Penny-Wise and Pound-Foolish

If he is not prepared to machine the badly worn measuring chamber of a meter with the required accuracy, it is poor policy and poorer economy to stick a new piston in it and try to kid anyone into thinking it is a good job. It is much better to ship the meter to the factory for proper repairs or replace it with a new assembly. If the winding in a pump motor blows, he should not block a coil or two and think himself wonderful because the motor will run again. He may tide over an emergency but he is multiplying the possibilities for future trouble. Unless he is prepared to properly re-wind the coils and test the motor for shorts, grounds, resistance, impedance, lock-torque, electromotive force, and a few other things, he should turn it over to some one who is prepared.

Fortunately for the ownership of the water-works and the consuming public, not many situations arise that small water-works repair men cannot master satisfactorily. It is surprising the things they sometimes do with the little they have to do with. The writer's hat is off to them, not because he has belonged to the clan but because, having belonged, he knows them so well.

The skilled mechanic in the meter shop of a large water-works does a wonderful job with his precision instruments, fine tools, gages and jigs. He would, however, doubtless be somewhat chagrined, and possibly a little bit at a loss, if he were called upon to crawl down in a muddy bell hole and pour a wet joint some raw winter night. This is not said to his discredit. In the work he is trained to do, he is an

expert doing a precise job that less skillful men cannot do.

The small water-works man, while perhaps not an expert in any kind of repair work, is sufficiently skilled in many kinds to do them all in an acceptable manner. Putting in a full day doing all kinds of repair work from stripped meter registers to ruined pump bearings; from a clogged chlorinator to a broken fire hydrant; from a leaking service pipe to a balky engine, he goes from job to job with never a minute off except, perhaps, to compose the erupting temper of some irate customer. In the evening he may step out of his role as repair man and help the office by doing a creditable job of posting accounts. At last, having sunk into a dreamless sleep, the emergency bell awakens him at midnight to stand on his head in a water filled hole and drive a redwood plug in a rust pit to stop a squirting stream of liquid ice that is flooding the main street of the town. Some of you, who have grown up in the pampered ease of a large water-works, may think this a far-fetched picture. Be assured that if anything the account is too conservative as our own experience, backed by countless others, can verify.

Repair Records

The third and final part of the subject is Repair Records. When a repair is made, it should not be considered complete until a detailed record of it has been filed for future reference. Many small water-works do not keep any such records at all, which is another difference between them and large water-works. Almost without exception the large systems maintain complete records of every repair job. Their organized, systematic control of procedure and economy of repair costs would suffer if they did not maintain such records. A little thought and a short trial will convince any small system manager that repair records are just as important to them as to the large system and that, if they do not keep them, their plant will suffer accordingly. To be of any value to either they must be consistently maintained and frequently consulted. Like the index of information sources, the form of the record is not material though again the card system will be found an excellent one.

Repair records are important because of the method and procedure data they preserve and the accounting data they furnish. If they are properly made they will provide the information in future years necessary to check the success or failure of each repair or repainting job against the exact methods and materials used in the job. Many valuable improvements in repair procedure can be made and costly errors avoided in future repairs, if the detailed records of similar jobs are carefully studied and compared after actual service has proven their worth or weakness. Memories are tricky and the very best ones are not altogether reliable. Only by written records can we at a later date be sure of all the important details of today's repair work.

The accounting data included in the repair record will give the cost of each job, by which it is possible to evaluate and compare different methods that may be used for similar repairs. Such information is necessary in future work to determine economical procedure and to help make intelligent decisions between like repairs and new replacements. It is also the proper supporting data for ledger entries to expense accounts; and, by it, the supplies and materials used in repairs are checked from the stores inventory, enabling the office to order necessary replenishment of stock.

The repair man is not necessarily the one who should maintain the repair records, but either he or his foreman should furnish the detailed description and information from which the record is made. This helps to fix the responsibility on the men who did the work; who have first hand knowledge of what was done and what was used, for, like the repair job itself, the record must be correct. Errors, omissions, and discrepancies destroy its value, because, if it is not reliable, it is worthless.

From the field notes covering the repair, the office help, if they are not too overtaxed, can prepare the record. They can price the items and make the extensions, enter the explanatory data, post the expenses, reconcile the inventory and place the necessary orders.

The repair gang has repairs to make. They have work to do, and a tradition to maintain—namely, that "*Water Supply and Service Must Not, and Will Not, Fail.*"

From Errand Boy to President

In 1909 at the age of 16, a young man quit school to go to work for Allis-Chalmers as errand boy. Just 31 years later, at 48, this same Walter Geist has been elected President of his company, reported to be producers of the greatest diversity of capital goods of any company in the world. His election as President was announced by the Board of Directors of the Allis-Chalmers Mfg. Co. on May 7th as the successor of W. C. Buchanan, who retired recently because of ill health.

Walter Geist, with a bent for mechanics and engineering, became a tracer and then draftsman and designer. At 31 he was made Engineer-in-Charge of Transmissions. In this position he was inventor and developer of the now famed Multiple V-Belt Drive of Allis-Chalmers, since known as the "Texrope V-Belt Drive." This contribution to improved transmission is said to have alone been responsible for a volume of business for his company in excess of $30,000,000 since the V-Belt was perfected in 1925.

The extensive traveling that Mr. Geist did in establishing markets for his Texrope Drive put him in constant contact with the company's many district offices. During this period, he acquired so intimate a knowledge of the personnel and the workings of the district offices, that in 1933 he was made General Representative of the Allis-Chalmers Company, in which position he was in charge of the personnel of its fifty-two district offices, foreign and domestic, all dealers, sales promotion and advertising.

The manner in which he handled this job was recognized in 1939, when the Board of Directors made him a Vice-President of the company.

The importance of the Texrope Drive invention was recognized in 1940, when a committee of distinguished scientists, headed by Dr. Karl T. Compton, President of the Massachusetts Institute of Technology, awarded Mr. Geist the coveted honor in the form of the "Plaque of a Modern Pioneer" for his research and original work in the Power Transmission Field.

In April of this year, he was made Executive Vice-President by the A-C's Board of Directors, and, just one month later, finds himself the new President.

The story of the rise of the once struggling and ambitious youngster —Walter Geist—is the story of free enterprise and its incentive to ambition. It's a story of the American way of life—something worth fighting for.

MONTANA SECTION IN HELENA

Features Wartime Methods and Operations Under Priorities

A Report by
C. W. BRINCK
Ass't Engineer
STATE BOARD OF HEALTH
HELENA, MONT.

PRIORITIES and defense assumed prime importance at the 17th Annual Meeting of the Montana Section of A.W.W.A. held in Helena on April 17 and 18. There were seventy-two in attendance from Montana, other states and Canada.

The meeting was called to order on the morning of the 17th by Chairman H. B. Foote, Director of the Water and Sewage Division of Montana State Board of Health. Mr. G. J. Beiswanger, Water Department, Billings, acted as Secretary throughout the meeting in the absence of Ralph Miracle who was out of the state. Mayor John J. Haytin of Helena gave the address of welcome. This was followed by an address by the Honorable S. C. Ford, Governor of the State of Montana, who stressed the importance of civilian defense in Montana when he explained the present defense program for the state. Governor Ford stated that we must be prepared for any emergency and invited the water works men to attend the state school for civilian defense to be held in Helena May 11 to 16. He stressed the importance of water works in the civilian defense, and in maintaining the health of the nation during this critical period.

Mr. H. B. Foote, in delivering the Chairman's Address, stated: "Home defense has received its full share of attention, and many of us feel that since the public water supply in any community is of such vital importance, there is a definite place for those who are left to serve the common good by remaining at our usual posts. There is no glory in this, nor is there any heroism; nevertheless, we find a satisfaction in the knowledge that we are helping materially to keep the home folks healthy and normal, ready to serve to their best advantage wherever they may be called."

Mr. Foote continued, "There is also the vital necessity of keeping our water plants not only in first class operating condition, but also free from any untoward accidents or interruptions due to sabotage."

The National Director for the Montana Section, Mr. Wade Plummer, Superintendent of the Butte Water Co., reported on the board meetings at Toronto and New York.

Fuller Award to Foote

The Fuller Award was voted to H. B. Foote, as announced by the chairman of the Award Committee, W. M. Cobleigh, Dean of Engineering at Montana State College. Mr. Foote has been Secretary of the Montana Section for sixteen years, and during the past year was its Chairman. During his many years with the Board of Health he has been constantly aiding and instructing operators in methods for improving the quality of water distributed. Other members of the award committee were Fred Quinnell (Bozeman), Claude W. Eyer (Glendive), John W. Hall (Fort Shaw), and Fred E. Brandis (Chinook).

Chairmen

(Incoming)
F. F. Palmer
City Engineer
Forsyth

(Retiring)
*H. B. Foote**
State San. Engr.
Helena

**Also recipient of the George W. Fuller Award and re-drafted as secretary of the section.*

Mutual Aid Plan Endorsed

The Resolutions Committee endorsed the mutual aid plan and "full support in any other such activity as appears essential for the full protection of public water supplies during the period of national emergency." Also a vote of thanks was tendered the speakers, including Major G. E. Arnold, O. C. D. Regional Sanitary Engineer, San Francisco; Kenneth Logan, Federal Bureau of Investigation, Butte; Harry Jordan, Secretary of A. W. W. A., New York; Dean W. M. Cobleigh, Montana State College, Bozeman; and H. B. Foote, State Board of Health, Helena.

A buffet dinner-dance was held Friday evening at the Montana Club. Saturday noon the water works men were guests of the City of Helena at a luncheon served at Eddy's Drive Inn.

Officers for 1943

The new officers for 1943 are:

Chairman

F. F. Palmer, City Engineer, Forsyth.

Vice-Chairman

S. R. Young, Water Sup't., Hardin.

Trustees—John Hall, Fort Shaw, and A. E. Heath, Billings.

National Director (three year term)—H. S. Thane, Montana Power Company, Missoula.

H. B. Foote was "drafted" as secretary for 1943. The position which he had long held prior to his election as chairman last year.

Mr. Palmer, in his acceptance speech, stated that "We will do all we can for the other fellow in times of emergency."

Wade Plummer (Butte) was Chairman of the Nominating Committee, with J. M. Schmit (Lewistown), C. O. Lauer (Gardiner), J. R. Cortese (Livingston) serving on the committee.

Billings Next Meeting Place

Billings was unanimously chosen as the 1943 meeting place after H. S. Thane, Chairman of the Meeting Place Committee, recommended that the 1943 meeting be held there. Other members of the committee were: A. L. Hewett, Superintendent of the Billings Water Department, Billings; Tom Evans, Superintendent of the Filter Plant, Great Falls; G. H. Downs, Crane Company, Billings; and J. J. Haytin, Mayor, Helena.

Officers and Distinguished Guests

(1) *John W. Hall, Consulting Engr., Fort Shaw, Mont. (Trustee)*

(2) *H. S. Thane, Supt., Montana Power Co., Missoula, Mont. (New AWWA Dir.)*

(3) *Mayor J. J. Haytin, Helena, and Harry E. Jordan, Exec. Secy., AWWA*

(4) *A. E. Heath, Water Dept., Billings, Mont. (Trustee)*

(5) *S. R. Young, Supt. of Water, Hardin, Mont. (New Vice-Chairman)*

Procuring Water Works Materials

The **"Procurement of Essential Water Works Materials"** was the subject of an address by **Harry Jordan,** Secretary, A. W. W. A., New York. He stated that operators must remember that the first line to military production is to concentrate on only essential building and repairs during the wartime emergency and should adopt the motto, "Not too much that isn't important." The requirements today are greater than the capacity and supply. For example, hose nozzles and couplings will no longer be brass, but will be cast iron. The valves which are now being manufactured under priorities regulations will meet the A. W. W. A. standards. In some instances this will require more material, but it does tend to standardize and simplify production, thus speeding production and eliminating the storing of odd-sized valves. He urged the use of alternate equipment and that non-essential work be avoided.

"It must be kept in mind at all times," Mr. Jordan stated, "that there should be no slackening of necessary work to keep water plants operating efficiently to safeguard the health of the people at home."

Mr. Jordan's talk included an explanation of War Production Board orders covering the water works field.

Round Table Discussion

(C. W. Eyer, Leader)

The round table discussion was led by C. W. Eyer of Glendive, and started with a series of questions and answers relative to the effect of priorities on water supply systems. Mr. Jordan brought out that copper tubing or red-brass pipe on hand could be used from the main to the curb-stop, but that this material can not be replaced.

Mr. Arnold of Glasgow asked if restrictions applied when substitutes, such as Transite pipe, were available. Mr. Jordan replied that no extensions over 250 feet could be installed under the present ruling.

The Mutual Aid Plan brought forth considerable discussion at the round table. The plan was explained by H. B. Foote. Mr. Jordan stated that the War Production Board favors the Mutual Aid Plan as a method of reducing required inventories for water plants, and that ratings could be obtained in placing orders for the purpose of replacing material borrowed during an emergency.

Mr. R. E. Setterstrom, Montana Power, Butte, discussed conservation and care of equipment that is now in use.

Water Supply in National Defense

The Friday afternoon meeting covered all phases of federal government activities which affect the water man. **Major G. E. Arnold,** Regional Sanitary Engineer, San Francisco, and now assigned to the Office of Civilian Defense, talked on **"Importance of Water Supply in National Defense."** He stated that water supplies are important to:

1. Industrial Development.
2. Railroads.
3. Domestic Purposes.
4. Fire Fighting.
5. Health and Sanitation.

He advised the water men to consider the possibility of evacuees moving into their localities and the problem of supplying sufficient water for the increased population.

Major Arnold then discussed the various phases of the Mutual Aid Plan and how it is working in other states. The preparation of the inventory is very important and all material must be listed. Included in the inventory should be a list of personnel, including auxiliary repairmen such as plumbers who have been properly trained to repair water mains. Also in the inventory should be a list of equipment which could be used even though it is not owned by a water department. This entails cooperation with contractors in the area who have suitable equipment available.

A survey of tanks and trucks that could be used in an emergency for hauling water was also recommended by Major Arnold. In order to clean tanks for use in delivering water which have been used for ethyl gasoline, he advised flushing the tank with non-leaded gasoline, steaming, disinfection by chlorination, and finally flushing with water.

Major Arnold stressed that the Mutual Aid Plan must be used for emergency only. Emergencies would include damage by enemy action, damage by earthquakes and damage by fire.

Mr. Kenneth Logan, Federal Bureau of Investigation, Butte, brought out that there are five types of sabotage: (1) Mechanical, (2) Arson, (3) Chemical, (4) Explosives, (5) Labor. Labor sabotage is the hardest to combat, and if any person is suspected that person should be closely watched by persons whose records are unquestionable. A suspected person should not be placed at a vital point and should work with others.

Mr. Logan suggested that utilities maintain complete cooperation with the police, army, navy and F. B. I. in order to prevent sabotage. Guards are very essential and their cost cannot compare with the cost of replacement if a unit is damaged.

Rumors are one of the biggest problems of law enforcement today. Many rumors are part of the axis

program, and Mr. Logan urged that each person do his part in stopping rumors by attempting to locate the source of the rumor and report it.

Mr. A. H. Tuttle, District Engineer, U. S. Geological Survey, Helena, discussed the relation of the Geological Survey to the State of Montana, and various problems relating to water rights and their ownership in Montana.

"Water" was the subject of an address by **Mr. Fred Buck,** State Engineer, and also Chief Engineer of the Montana State Water Conservation Board, Helena. Mr. Buck stated that in Montana laws pertaining to water rights were the poorest of all seventeen western states. He further stated that compacts are necessary if the states are to control the streams. The streams in Montana have been decreasing in flow since 1916 due to the cumulative deficiency in precipitation, while during the same time the temperature has shown a steady increase.

There are five watersheds in Montana. These include Missouri, Little Missouri, Hudson Bay, Yellowstone, and Columbia. Congress has permitted Montana, Wyoming and North Dakota to form a compact to control the Yellowstone River, according to Mr. Buck. In this program it is planned to equalize the flow in the Missouri River by placing a dam near the site of the present Canyon Ferry Dam.

Mr. O. A. Baarson, Priorities District Manager, Helena, presented in his paper (read by Mr. H. K. Anderson), **"The Reason for the War Production Board and How It Operates."** The policy of the War Production Board is best summarized in a statement from the Priorities Division which Mr. Baarson quoted: "Our general policy is simple. Production shall be stimulated and organized to the limit of the nation's resources. Every available man and machine must be employed either on direct defense requirements or at work essential to the civilian economy. Along this road lies protection of our freedom and of the basic economy necessary to maintain that freedom.

"We must forego the less essential that we may have an abundance of the more essential. Wherever it is possible to convert the less essential to military or essential civilian production, this will be done."

Mr. Ben Chestnutt of the War Production Board, Helena office, was present to answer any questions which the operators desired to have answered regarding priorities.

(1)
Wade Plummer, Supt.
Butte Water Co.
(AWWA Director)
and
J. M. Schmit
City Engineer
Lewiston

(2)
Kenneth Logan
F.B.I.
Butte
(Discussed prevention of sabotage)

(3)
Maj. G. E. Arnold
U.S.P.H.S., San Francisco
(Regional Engr., O.C.D.)

(4)
Dan Cloninger
Water Dept.
Helena
and
C. W. Eyer
City Engineer
Glendive

Mr. A. K. Richardson, City Engineer, Helena, described the Helena water system prior to the Saturday afternoon trip of inspection, which included the Hale and Woolston reservoirs, and the 10-mile settling basin and chlorinating house.

Annual Water Works School Preceded the Meeting

The 10th Annual School for Water Works Operators was held in Helena on April 15 and 16 in conjunction with and just prior to the Montana Section meeting. The school, conducted under the direction of Dean W. M. Cobleigh, Montana State College, and H. B. Foote, State Board of Health, was this year attended by 55 superintendents, operators and engineers without counting out of state attendance, almost as many as were present for the Section meeting.

The method of conducting the school this year was slightly different from previous years. The main topics were discussed first by either Dean Cobleigh or Mr. Foote, following which those attending were invited to relate their experiences and to freely ask questions about each topic during the process of the discussions. This method proved to be very successful in that one operator's problem may have been successfully solved by another at some time. This made possible a valuable exchange of ideas among the operators.

School Topics

The following items were discussed: Surface waters and related problems; ground waters and their problems; water purification (presedimentation, coagulation and sedimentation, filtration, disinfection, removal of color, odor, taste, and removal of iron and manganese); water conditioning for public consumption and for industrial uses; and effects of storage and distribution conditions upon the quality of water.

Dean Cobleigh discussed the various unit operations and processes which are carried out in the water plant. The unit operations include sedimentation, filtration, aeration, and pumping of water. The unit processes consist of coagulation, disinfection, removal of tastes, odors and color, and softening water.

Mr. Foote covered the biological aspects of water storage, treatment and distribution. In this talk he showed the effect of the various natural agencies upon water when in impounding reservoirs, distributing reservoirs, streams and open channels.

In the course of the discussions Sup't. Young of Hardin (the new Vice-Chairman) told of the advantage of presedimentation in handling a water with 5,000 to 10,000 parts per million turbidity. Superchlorination was discussed by Mr. Shogren of Billings. He showed the importance of preliminary studies on the water to be treated, leading to the satisfactory results obtained from super-chlorination when the river water carried oily wastes. Mr. Voden of Great Falls told of the finding of daphnia in one of the distribution reservoirs, which could only be explained by the presumption that the eggs of the organism had passed through the filter beds.

[Ed. Note—It has been noted elsewhere that cyclops and daphnia can pass through the space between the filter wall and the sand bed if there is any appreciable bed shrinkage or compacting, which causes the edge of the sand bed to pull away from the side walls. Therefore, it is possible not only for the eggs to pass a filter but also the adult crustacal.]

WARTIME CONFERENCE OF A.W.W.A. TO DRAW LARGE NUMBERS

IF THE "straws" that usually indicate the expected size of A. W. W. A. conventions in advance can be taken as a true indication of what the attendance is to be this year at the Wartime Conference of A. W. W. A. in Chicago, June 21-25, the meeting is to be as well attended as recent conventions—if not better attended.

First "straw" is the report of the headquarters hotel (Hotel Stevens) to A. W. W. A.'s office as to the number of room reservations made this far in advance of the Conference.

Second "straw" is the recent influx of exhibitors which has taxed the Exhibits Committee to find space for, and surpassed expectations in this year of too-much-business and production limitations imposed by priorities and allocation regulations of the War Production Board. The impressive list of 80 firms which are to exhibit is appended. The number of spaces taken to date is 101, requiring an unexpected expansion and rearrangement of exhibit facilities.

Technical Program Developed To Answer Many Questions

Since the full Technical Program for the Wartime Conference has already been published in our April issue (see pages 182 and 183), it will not be reproduced here. However, some of the important questions which the program has been developed to answer justify stressing because of their importance to great numbers of operating men at this juncture. Some of these questions are: "What can we use instead of what?"; "How can it be gotten most readily and promptly?"; "How best to proceed in guarding properties?"; "How, and where, can the greatest assistance be secured when needed?"; "Organization for taking care of emergencies"; "How to keep the water works going when everything is hard to get"; "How the Mutual-Aid plan works"; "How can we hold onto it after the war?"; "Is a chlorine residual through to the ends of the system justified—if so, how best to reach this objective?"

Concerning Priorities

Then, too, it is worth re-emphasizing that the "Priorities Clinic," arranged for the benefit of those attending the Conference, should in itself justify the trip to Chicago by many. As a matter of fact, if stricter regulations now proposed by the W. P. B. go through, the restrictions on procurement of important materials and equipment for operation and maintenance of water works systems will make it imperative to raise a voice from water supply executives which can be heard more forcefully through actions taken by the leading association of the industry than in any other manner. It seems that in the proposed complete denial of any copper, bronzes and brasses, and some alloy steels, to users which do not have a priorities rating better than the A-5 and A-2 now permitted under W. P. B.'s Maintenance and Repair Order P-46 water utility operations are to suffer a sharp blow and manufacturers of meters, valves, hydrants, and even some purification equipment will be forced to shut down on any who order equipment unless a rating of A-1-K or better can be shown by the customer. If the stiffened regulation is put into force as contemplated, it will be essential for water works operators to rise in vigorous protest unless public water systems are given the A-1-K rating required if essential operating equipment and materials are to be procurable.

This is no time for quibbling or watchful waiting. If the War Production Board cannot recognize the importance of water supply in the Defense and War Production Program, every water works executive possible should come to the Chicago Conference to learn all of the facts as they develop up to June 21st, and enter into whatever action the Association finds expedient to propose in order that water supply will not fail in any quarter.

The Question of Doing With What You Have

In the direction of making the most of what water utilities already have and placing utmost emphasis on repairs and maintenance in order to take as little from direct war production as possible, this policy and practice is to be emphasized at the Chicago Wartime Conference.

Toward this end the water works equipment manufacturers in their exhibits this year are featuring SERVICE rather than sales. In other words, there will be numerous equipment exhibits of a "new order," wherein the Conference attendants will learn of measures and means whereby the serviceable life of operating equipment may be extended; wherein substitute materials may be employed to render satisfactory service for the duration at least; wherein one piece of equipment may be made to serve where two pieces are ordinarily required; wherein rehabilitation of old equipment may be possible. It will be extremely interesting to see how effective this sort of "Service Over Sales" policy can be made in our exhibit hall. It certainly has great possibilities and usefulness at this juncture.

Cooperating Exhibitors

In high regard for the manufacturers who are purchasing exhibit space, with the understanding that they are expected to do an educational job this year in the direction of service rendered as contrasted to sales promotion of the past, the following list of exhibitors may this year be considered something of an Honor Roll.

Activated Alum Corp.
American Cast Iron Pipe Co.
American City Magazine
American Rolling Mill Co.
American Smelting & Refining
Atlas Mineral Products Co.
Badger Meter Mfg. Co.
Barrett Div.
(Allied Chemical & Dye Corp.)
Birch Mfg. Co.
Buffalo Meter Co.
Builders Providence, Inc.
Calgon, Inc.
Central Foundry Co.
Centriline Corp.
Chapman Valve Mfg. Co.
Chicago Bridge & Iron Co.
Chicago Pump Co.
Clayton Manufacturing Co.
Clow & Sons, James B.
Crane Co.
Darco Corp.
Dearborn Chemical Co.
DeLaval Steam Turbine Co.
Dorr Co.
Dresser Mfg. Co.
Electro Rust Proofing Co.
Engineering News-Record
Flexible Pipe Cleaning Co.
Ford Meter Box Co.
Foxboro Co., The
General Paint Corp.
Hanks Co., Fred W.
Hersey Mfg. Co.
Homelite Corp.
Hydraulic Development Corp.
Industrial Chem. Sales Div.
(W. Va. Pulp & Paper Co.)
Infilco, Inc.
Johns-Manville
Layne & Bowler, Inc.
Lead Industries Assn.
Leadite Co., Inc.
Limestone Products Corp.
Lock Joint Pipe Co.
Ludlow Valve Mfg. Co., Inc.
McWane Cast Iron Pipe Co.
M. & H. Valve & Fittings Co
Monsanto Chemical Co.
Mortell Co., J. W.
Mueller Co.
National Meter Div.
National Water Main Cleaning Co.
Neptune Meter Co.
Omega Machine Co.
Permutit Co.
Phoenix Meter Corp.
Pitometer Co.
Pittsburgh Des Moines Steel Co.
Pittsburgh Equitable Meter Co.
Proportioneers, Inc.
Public Works
Rensselaer Valve Co.
Ross Valve Mfg. Co., Inc.
Rusta Restor Co.
Simplex Valve & Meter Co.
Skinner, M. B.
Smith Mfg. Co., A. P.
Smith, S. Morgan
Sparling, R. W.
Thomson Meter Corp.
United States Pipe & Foundry Co.
Vogt Mfg. Co.
Wailes Dove-Harmiston Corp.
Wallace & Tiernan Co., Inc.
Waterous Co.
Water Works & Sewerage
Water Works Engineering
Wood Co., R. D.

WATER AND SEWAGE PATENTS

(Of Recent Issue)

Reported by
JULIAN F. SMITH*
CENTRAL COLLEGE
FAYETTE, MO.

Water Patents

Carbonate Removal. P. G. Bird (to National Aluminate Corp.). U. S. 2,276,560, March 17. Freeing water from carbonates in a tank having a bed of reagent for liberating carbon dioxide from carbonates, and a loosely packed aeration tower.

Leakproofing Reservoirs. Paul Bechtner (to American Colloid Co.). U. S. 2,277,286, March 24. Preventing flow or seepage from stored water by forming a compact blanket of dry swellable bentonite across the path of escape.

Water Pipe Joint. Ralph H. Hyde. U. S. 2,278,447, April 7. A rubber sealing ring to be intsalled between the bell and spigot ends of adjacent water pipe sections is formed in wedge shape with a rectangular groove in he base of the wedge. (The "Hyde-Ro" Ring.)

Treating Tank. G. S. Ralston (to Servisoft, Inc.). U. S. 2,278,488, April 7. An upright tank to be inserted in a water line is adapted for insertion and removal of water-softening cartridges in permeable sacks.

Sewage Patents

Clarifier. W. H. Green (to International Filter Co.). U. S. 2,276,300, March 17. Apparatus for clarifying liquids has a reaction chamber and an upwardly expanding clarification chamber from which conduits lead to the reaction chamber.

Settling Tank. H. L. Alexander, Hubert I. du Pont and W. B. Foulke (to Delaware Chemical Engineering and Development Co.). U. S. 2,277,053, March 24. A settling tank for separating solids from liquids has a sludge feed pipe ending near the bottom of the tank, a drawoff channel near he top and a scum gutter near the drawoff channel.

Sludge Treatment. M. D. Sanders (to Industrial Patents Corp.). U. S. 2,277,718, March 31. Sludge to be dewatered is first fermented sufficiently to form gas, then heated to separate water.

Flocculator. R. T. Steindorf (to Chain Belt Co.). U. S. 2,277,890, March 31. A flocculating tank has paddles on horizontal shafts, and baffles between the paddles.

Sewer Cleaner. Henry M. Smith (one-half to Wm. D. Osborn). U. S. 2,278,026, March 31. A sewer or pipe cleaner has cutters mounted on a shaft, a sliding housing and a sliding collar, and strong springs to keep the cutters positioned against the pipe.

Sewer Cleaner. Wm. M. Emery (to Oster Mfg. Co.). U. S. 2,278,067, March 31. The driven spindle of a sewer cleaner has a chuck positioned off from the center of rotation to impart spiral motion to a snake passing through the spindle.

Septic Tank. Austin Bent. U. S. 2,279,813, April 14. A combination septic tank and grease trap has two compartments with separate inlets, and a baffle in each compartment.

Drying Sludge. G. C. Unger, Jr. (to Engineering Development Corp.). U. S. 2,279,848, April 14. A sludge drying tank has an elongated carriage for plow disks, and a blower for aerating the sludge turned up by the disks.

Thickener. Harrison S. Coe. U. S. 2,279,970, April 14. A settling tank and thickener has a sludge outlet in the bottom, a rotary impeller for guiding sludge to the outlet, a baffle and a scraper which is arranged so that it can pass the baffle.

*Associate Director, Hooker Scientific Library.

WESTERN SECTION OF N. Y. SEWAGE WORKS ASSN. MEETS IN OLEAN

A Report by

GEORGE E. SYMONS*
Secretary-Treasurer

THE Spring Meeting of the Western Section of the N. Y. State Sewage Works Association was held April 18th in Olean, N. Y. Considering the location of the meeting in the southern fringe of the area served by the Section, the attendance of 33 members and 14 guests was "fair."

The meeting was opened by Chairman Al. Martin, of Kenmore, N. Y., who introduced as special guest Mr. Linn H. Enslow, editor of WATER WORKS AND SEWERAGE.

The Section's Chairman
"Al" (A. E.) Martin Kenmore, N. Y. (Commissioner of Sewerage, Town of Tonawanda)

Secretary
Geo. E. Symons, Chief Chemist Buffalo Sewer Authority Buffalo, N. Y.

At the luncheon the Section was honored by the presence of Olean's Mayor, W. D. Duggan, who made a brief talk, and other city officials.

At the close of the meeting Olean's attractively located and neatly kept Treatment Plant was visited. Here a demonstration was made of the air lift recirculating grit washer described in the forenoon session by Nelson A. Fuller, Supt. of Water and Sewage, who conceived and designed this inexpensive and efficient unit.

Johnson New Supt. of Buffalo Plant Takes Over Program Chairmanship

Chairman Martin announced that Mr. Charles R. Velzy, President of the parent N. Y. State Association, had resigned his position at the Buffalo Sewage Treatment Works to become associated with Greeley & Hansen, Engineers, and that Mr. John W. Johnson, former Assistant Supt., had been appointed to take his place in the Buffalo Plant.

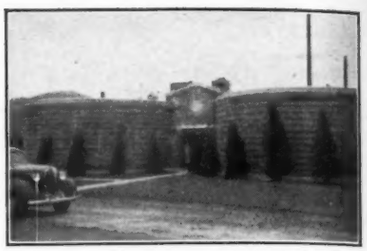
Mr. Johnson, Chairman of the Program Committee, introduced Mr. Fuller, who talked on the Olean Sewage Plant and experiments on sludge digestion.

Utilizing a map of the city, Mr. Fuller showed the sewer system and the interceptors and described the location and design of the plant. The digestor capacity is large enough to take both the sewage sludge and garbage. In the spring, due to the fact that a combined sewer system exists, there is such high flow of water and the sewage is so dilute as to reduce the raw sludge loading on the digestion tanks to a very low figure. There is an attendant reduction of gas.

Another factor of interest is the grit received from the Pennsylvania Railroad Shops which settles out along with some garbage and sewage particles in the grit chamber. Because of the difficulties of cleaning this grit chamber by hand, an air lift unit was designed for grit removal. Whereas a mechanical remover would have cost $5,000 by utilizing a 105 cu. ft. air compressor which was on hand, an air lift system was built for $75. The grit chamber can now be cleaned in 30 minutes. It formerly took three man days to clean out approximately 20 cu. ft. of grit removed per week from 2½ to 3 mgd. sewage flow. (This unique installation is to be described in an article by Mr. Fuller which will appear in an early issue.—Ed.)

Talking with the aid of large graphs of gas production and other items concerned with digestor operations, Mr. Fuller presented a discussion of their experiments using ammonium sulphate in the digestors. Until the digestors were separately emptied and cleaned last year there had been a considerable accumulation of scum. Since the cleaning, the use of scum pumps located under the floating covers which jet 200 gpm. of supernatant liquor out into the sum has maintained the depth of the scum layer at about a third of what it formerly was.

Programmers
Park W. Judah Lubrication Engr. Stand. Oil of N. J. Buffalo
John W. Johnson Supt. Treat. Wks. Buffalo (Program Chair.)



Olean's Digesters
(A battery of four)

Following the cleaning of the digestor, it was observed that although 50 per cent old sludge was used for seeding, the gas production did not return to normal. Therefore, Mr. Fuller began to add ammonium sulphate at the rate of about ten pounds per day, two or three times per week. Thereafter, it appeared, according to Mr. Fuller, that the gas production increased approximately 20 per cent above what it had been in the previous years. But when he began to analyze the theory of digestion and studied the literature, Mr. Fuller stated that he believed the case was against the use of ammonium sulphate rather than for it. Pointing out that there was now less material going into the scum and that the volatile content of the raw sludge was higher, Mr. Fuller indicated that perhaps the increased gas production may have been due to other factors than the addition of the ammonium salts.

Hosts
Nelson A. Fuller Superintendent Water & Sewerage
W. A. Duggan The Mayor of Olean

In discussing the paper, Mr. Enslow told of some of his experiences in Texas a number of years ago and suggested that part of the increase in Olean's gas more than likely was due, not to the ammonium salt added, but to the improvement in the scum condition and the fact that there was

*Chief Chemist, Buffalo, N. Y., Sewer Authority.

a greater percentage digestion of the volatile matter during this period of keeping the scum thin and warmer, by the insulation of the covers, than in the previous year.

"Doc" Symons raised the question as to whether or not there had been an actual increase in solids loading, as well as an increase in per cent volatile matter in the raw sludge and increased per cent digestion. Mr. Fuller replied that the per cent removal of suspended matter had been practically constant. It was pointed out that the actual removal of pounds of solids might have been greater if the suspended matter in the raw sewage were higher, although the per cent removal was the same each year. He pointed out that digestor liquor normally contains about 4,600 ppm. of NH_3 as the bicarbonate. It would be strange if the added ammonia salt contributed anything.

Control of Filter Ponding

J. T. Howson, operator at Westfield, N. Y., was introduced and described the plant and problems of operating a sewage treatment plant in a canning factory town. Westfield has considerable tomato waste. Not only does the problem of handling wastes of quite variable compositions keep the operator on his mettle, but ponding of the filters takes place and heavy growths of filter flies are observed in the summer. In an attempt to eliminate ponding of the filters, Mr. Howson tried repeated floodings and dryings of the bed, with practically no beneficial results. Treatment with chlorine was then tried and it was found that the addition of chlorine solution directly to the ponded filter surface at the rate of 200 pounds per day destroyed the biological life of the filter for four to five weeks. Control of the filter fly had been tried by flooding the filter.

The next experiment during the spring and summer of 1941 was to combine chlorination and flooding. It was found that 5 to 8 p.p.m. of chlorine added to the last two or three feet of water applied to the filter was sufficient to eliminate ponding when treated at least once a month. B.O.D. removal by the filters likewise increased from 72.6 to 84.6 per cent in spite of the fact that the sewage was somewhat weaker.

In another experiment, recirculation of the effluent from the trickling filter back to the influent of the settling tank was tried. This was done for the double purpose of overcoming the fly nuisance and attempting to improve the filter effluent during

"Ed" J. Smith, Supt. of Sewerage, Niagara Falls, N. Y. (Chairman Program Comm., N.Y.S.S.W.A.)

A. H. Mann, Chief Operator, Olean Treatment Plant (Has cause to be proud of his plant)

John T. Howson, Supt. of Treatment, Westfield, N. Y. (Reported success with combination of flooding and chlorination for filter fly and ponding)

the canning season. One filter ran continuously and the other one was operated at normal rate. Mr. Howson said, "The filter flies not only did not disappear, but actually were much thicker on the faster filter, and the effluent from the slow filter was but slightly better than when both filters were running normally. The difficulty in evaluating the effect of this recirculation lies in the fact that tomato waste contains a large proportion of very light solids which settle slowly; when recirculation is used, the sedimentation detention period is reduced to half of the normal time, thus much of this light material is carried on to the filters.

Had not the war intervened, it was planned to alter the piping so that recirculation could be carried out from the filter effluent to the filter influent, but this project has been postponed.

Lubrication Discussed

Following lunch, a film on lubrication was presented by Messrs. Howard Mellor and Pat Judah, of the Socony-Vacuum Oil Co. This motion picture showed the part of oil lubrication in the progress of the machine age. By diagrammatic presentations of operating systems, the theory of lubrication for a variety of conditions was shown. These applications included completely flooded and partially lubricated bearings, gear lubrication and lubrication in internal combustion systems. The relation of the type of oil to temperature, pressure and velocity was indicated, and the part which chemical stability of oil plays in proper lubrication was delineated.

In discussing the film and its applications, Mr. Judah answered a number of questions particularly on the subjects of conservation of lubricants, flushing, and how to obtain the right amount of grease for ball or roller-bearings. Regarding flushing, Mr. Judah warned that kerosene should never be used, stating that light oils cut the lubricity of heavy oils to a greater extent than the proportion present would indicate. "Theoretically a ball-bearing needs no lubrication," said Mr. Judah, "but practically there is a split second when there is deflection of the spherical surface to that of a plane and it is the function of the bearing lubricant to offset this effect. Such lubricants must be good for high pressure and prevent corrosion. Except in the case of high temperature," Mr. Judah continued, "use light oil, for the load moves faster than the oil is squeezed from beneath the bearing and therefore lubrication is effected."

As to the amount of grease to use in ball or roller-bearings, the application should be controlled so that only approximately two-thirds of the free space is filled. If the free space contains too much grease, a pumping action will occur within the bearing and this is definitely harmful. It is better to under-lubricate a ball-bearing than to over-lubricate, for once filled, a bearing cannot run dry. In filling the bearing, Mr. Judah suggested that it be run with the plug out for 30 minutes to make sure that all excess grease which might be "pumped" is forced out of the bearing. He had no suggestion to offer as to how a bearing could be cleaned without disassembling and he warned against the use of carbon tetrachloride in cleaning ball-bearings.

The meeting closed with an inspection of the Olean Treatment Plant where the Fuller air-lift grit washer was demonstrated.

Paul Kriegel, Operator, Attica, N. Y., State Prison and Clem Keller, Operator, Gowanda State Hospital, Helmuth, N. Y.

Olean's Supt., Nelson Fuller, demonstrates the Air-Lift recirculating grit washer

Archie Sickler, Chief Operator, and Alex. Moor, Supt., Sewer Maint., Amherst, N. Y.

LET'S FACE THE FACTS

The Home Front Is the Production Line for Tools of War— Its Support Is the Role of Municipal Services

By WILLIAM L. SYLVESTER
Assistant to the Commissioner
DEPARTMENT OF PUBLIC WORKS
CITY OF NEW YORK

A TASK of such magnitude as to be regarded in some quarters as virtually impossible has faced this Administration in marshalling the productive strength of the Nation to successfully wage a winning war.

The Author

Out of the treacherous attack at Pearl Harbor, an anomaly of good has come. Yes, a clear vision of an assured goal and a national unity of unprecedented fullness. Never has the strength of the American nation faced such a test. And, by the same token, never have the people of this Nation given such unmistakable evidence of the will, the courage, and the resourcefulness to win as thus far displayed by the armed and civilian forces at home and abroad.

Municipal Services—and the War Effort

Any rational approach to the problem of the relative importance of municipal services in the broad and critical national war program must, first and without exception, start from a complete and comprehensive realization that all else is secondary to the war effort. Normal procedures and services usually considered essential to the individual, or to the community, must be reappraised from this viewpoint of national emergency.

Those not contributing to the strength of the armed forces or not wholly essential to the maintenance of health of the citizens' army in the home communities must be subordinated to the primary nation-wide objective.

Let's Examine Our Personal Viewpoint

The preparation of a firm foundation is the obvious first essential to building a solid structure. It is equally necessary to a clear vision of the philosophy and practical aspects of our duties as citizens and to a reasonably accurate perspective of our responsibilities to the community in providing or maintaining sanitary and public health services, that we first have a thorough understanding of the demands of war on the individual.

Pearl Harbor is regarded as the greatest factor to date in uniting the people of our Nation in what we so readily proclaim as "all-out" war effort. But is it truly an all-out effort? We in the engineering and public service fields are certainly well acquainted with the simple mathematics and massed force of individual opinion shared by an entire community.

Suppose we apply the same illustration to the national situation. Perhaps we are doing our bit like millions of others—devoting a fair share of our income to the purchase of war bonds, subscribing as generously as possible to the Red Cross and the Community Chest, and are no doubt engaging in other current community activities associated with the war, but not to the extent of greatly interrupting our regular life nor the enjoyment of a nearly complete list of peace-time pleasures which supposedly "keep up the morale."

But now suppose we wake up to the fact that perhaps we and many of our friends are not recognizing the seriousness of the present war and the implications of failure. The *full capacity of each person* is an absolute necessity to enable the full effectiveness of the national strength to be focused on winning the war!

When peace comes, we can then return to normal lives—if we fail, there probably will be no normal lives to which we can return. Secretary of the Navy Knox said early in May that America's stake in the war is "all we have and all we are . . . it is them or us, and there is no quarter."

Federal Controls

We have discussed the serious need of adjusting the Nation's machinery to an "all-out" war program. Production on the home front and the maintenance of those services which keep the people strong and in good health to enable this production are vital elements in the success of our armed forces. To control the materials of production and secure a reasonably equitable distribution of those allowed for non-defense consumption, control by the Federal government was established while we were first acting as the Arsenal of Democracy under the provisions of the Lend-Lease Act. During the early part of 1940, the American defense program was inaugurated. We have seen the growth of an amazingly complicated organization develop at Washington and we have seen a constant shifting and changing of executives to secure greater speed and efficiency in meeting the national emergency.

OPM Graduates Into WPB

During this organization growth, the Supply Priorities and Allocations Board was created in the Office of Production Management as a control. Five months later, and within six weeks after this country had entered the war, this control was centralized in the hands of one man. On January 16th the President issued the Executive Order creating the War Production Board and made Donald Nelson the head of this powerful body. Although not disregarding the essential needs of communities and individuals, the primary objective of this single control over the entire production capacity of the country subordinates all others. Objective No. 1 is to secure for the armed forces of this country and our allies of the United Nations the things they need as fast as they can be produced.

This objective is assuming a dominant part in the

lives of all of us, and without reserve for the sacrifices it entails, has won fully anticipated nation-wide support and cooperation. The President has expressed this objective in terms of the materials of war, setting a production goal for 1942 which is now in excess of 50 billion dollars. Included for this amount are 45,000 tanks, 60,000 planes, 20,000 anti-aircraft guns and 8 million tons of shipping!

Speed and economy in the attainment of this staggering program is requiring the application of the highest procurement skill and experience of American business on the part of the government linked with the full production strength of American industry.

By comparison, consider just one of the Axis countries. Germany attained her readiness for war after years of preparation by making relatively simple economic changes. She merely erased from the lives of her people everything, down to the minimum essentials of living, which did not contribute directly to the creation of the war machine. It is now estimated that Germany and the nations under her ruthless control are producing the equivalent of 50 billion dollars' worth of war material per year—England, a peak of 15 billion dollars' worth! Without further figures on the other Axis powers and United Nations, we already have a gage of the magnitude of America's job—for we must make up the difference and a little more!

Priorities

Confronted with the stupendous task of meeting a constantly expanding goal, the Nation's war effort has accelerated with amazing speed. It is, therefore, not surprising that the machinery by which industry and its stocks of raw materials are controlled has also passed through some far reaching changes. Fundamentally, efforts to speed up the production program started months ago with an effort to proportion all available materials, machinery and production capacity equitably on the basis of army, navy and civilian needs. To accomplish this, a system of priorities and ratings was established which, in principal, took into account the relative importance of each proposed use in relation to the war program.

This simple principle, established by the Supply Priorities and Allocation Board (S. P. A. B.), was complex in operation and lacked the essential element of single control.

Some progress was made in the distribution of certain critical materials, notably steel, by direct allocation rather than by priority ratings. This scheme—perhaps too idealistic—never got under full headway principally because too little was known about the country's total supply of materials.

The reorganization by which control was centralized in Donald Nelson as head of the new War Production Board was regarded as a most far-sighted executive action to correct the flaws in the earlier body. The functions of the new office are under the direction of six divisions, of which the Division of Industry Operations, headed by J. S. Knowlson, is in charge of the allocation of all materials for both civilian and war use.

Construction Curtailed

As the tempo of the program increased, additional restrictions and regulations flowed from the W. P. B. office of such consequence as to fairly bewilder municipal officials, as well as the construction industry and civilians. Outstanding of the new orders was Conservation Order L-41, effective April 9th. It is regarded as the most drastic step towards converting the Nation to a total war effort since the Draft Act. Quoting directly, the terms of this order state that ". . . all construction which is not essential, directly or indirectly, to the successful prosecution of the war and which involves the utilization of labor, material, or construction plant urgently needed in the war effort, be deferred for the duration of the emergency." From now on the efforts of the construction industry must be devoted entirely to war projects and no construction, with minor exceptions, may be started without special authority.

The order does not, however, affect the ordinary work of repair or maintenance (without design changes) necessary to prevent deterioration and to keep the structure or plant in good working condition.

The W. P. B. reports that the construction industry faces this year a program of civilian and military construction estimated at nearly 14 billion dollars—more than a 20 per cent increase over the previous all time high in 1941. The stop order on non-essential building will release for work on these essential projects about 250,000 laborers and a large quantity of much needed construction equipment.

"PURP"—A Plan to Reduce Red Tape

After four months of trial, a seasoned plan for reducing many of the difficulties of the old priorities system, which fell short because so many practically useless ratings had been issued, will take over the field on June 30th, according to Director Knowlson of W. P. B.'s Industry Operations Division. After this date, no applicant, no matter how strategic his requirement, will get any priorities help except for a specific amount of material for a specific purpose for a specific length of time. It is also reported that after July 1st the provisions of "Purp," now available on request of the applicant, will be mandatory under a W. P. B. order.

The President's Seven-Point Program and Other Controls

On April 28th, the President announced to Congress and broadcast to the Nation a seven-point economic program which should be far reaching in its effects. The program, devised primarily to check inflation and combat the rising cost of living, was followed the next day by Price Administrator Henderson's order, effective May 18th, fixing rigid retail price ceilings on innumerable articles in everyday use.

On the same date rents for 86 million people (two-thirds of the nation) were frozen in over 300 communities designated as defense rental areas. Likewise, on the same date the W. P. B. assumed responsibility for the Nation's war essential power supply problems. The latter move is considered to be a step in clearing the way for rationing electric power if that possibility becomes a necessity.

Following closely on these regulations, W. P. B. issued an order on May 5th, effective August 3rd, prohibiting the use of iron and steel in the manufacture of practically every article used in civil life except nails, screws, hardware and certain types of food containers.

Chlorine, a vital chemical in both industry and public health, is now further restricted by allocation. Supplies of chlorine for water and sewage treatment are fortunately not curtailed by the order.

The use of rubber is restricted, tire rationing is with us, sugar rationing started early in this month (May), and gasoline rationing two weeks later. These various controls and restrictions point to just one thing—*the supremacy of the war program.* It is becoming increasingly evident that for normal or non-essential consumption there is less of almost everything today and there

may be little of anything tomorrow. In support of this viewpoint, it was recently reported in the technical press that industrial observers have concluded that civilian sacrifice through the diversion of materials to war use has only begun.

Sewage Treatment in Time of War

The preceding review of production and supply has fallen short of its purpose if it has left so much as a faint hope that, as the situation now stands, progress could be made on any but the most essential sanitary projects directly related to war work or those undeniably needed to safeguard the health of a community. It is no longer a question of what materials are available but of how can we manage without those we need!

Relative Importance Still a Gage

This crucial situation emphasizes the close scrutiny which a sewage treatment project must successfully meet to merit consideration under present circumstances. To retain a proper perspective, it is, therefore, fitting to review briefly the essentials of the problem divorced from all questions of priorities.

Pollution abatement and adequate water supply and sewage treatment services have long been recognized as essential community health measures. Since the beginning of history, when men first formed communities for mutual welfare and social gain, the proper disposal of wastes has been of first importance in safeguarding the very existence of cities from the ravages of epidemics. Scientific knowledge and engineering skill have brought relief to modern cities, but community sanitation is still a most pressing urban problem.

During the last quarter of 1941 and before our declaration of war, increased impetus was given to public recognition of this fundamental aspect of community life in a most significant way. The President himself, in a public statement, expressed the view that the completion of the sanitary system of a large American city was a defense measure urgently needed to safeguard the completion of defense contracts under way in this city, totaling about one billion dollars in value. Inadequate sanitary facilities were stated to be a threat to defense work from fires and a menace to the health and welfare of the people of the city upon whom so large a portion of defense work depended.

Probably never before has the close association of public health and welfare with water supply and sewage treatment had the public recognition of the highest officer of our government. It should be of interest to sanitary engineers and public health officials to emphasize to the people of their community this official restatement of a vital fact as the means of kindling a renewed appreciation of the importance of the water supply and sewage treatment facilities they now have, or which they may be considering for the future.

A Strong Home Front

The difference between ultimate victory or untimely defeat may depend upon the strength of the home front. To bolster that strength is the obligation and privilege of every official of every unit of government, local as well as federal. In wartime, the health and living conditions of the people upon whom production depends is more than ever a National as well as a local concern. The public welfare was never so important as now. When we keep a community healthful we add to the country's store of manpower. When living conditions are better because of proper sanitation, we add actual hours to the forces of the home front.

First Things First

At this point it may seem that we face two incompatible bases for action—the importance of sewage treatment to the community, and the W. P. B. orders restricting new construction. Further consideration of the logic and relative necessity represented will, however, yield workable results.

The most important step in this procedure is the sifting of the essential from the non-essential *before* attempting to secure Federal approval for the use of materials and machinery not already allocated to direct military and naval use.

This means bluntly putting *first things first.* The eradication of community bias in favor of unselfish adherence to the National good often permits facts to replace false hopes. We know that some sewage treatment projects might very well be deferred without serious jeopardy to the health and well being of communities. To decide this issue in advance and refrain from submitting for approval projects of doubtful eligibility is a cooperative effort that would help to relieve the congestion of unnecessary paper work in Washington and would clear the way for vital projects. As a measure of what this might mean, an unofficial disclosure in Washington indicated that about three months ago they were receiving the astonishing daily total of 15,000 applications for priorities on all types of projects. The rejection of about 90 per cent of these applications gives a measure of the tremendous resultant waste of time and money, much of which could undoubtedly have been conserved.

Essential Works

It is readily understandable that regardless of the engineering skill and knowledge supporting any given application, the final decision on the essential nature of the proposed works rests with the Federal authorities. The expanding war program which daily causes more and more materials to be listed as available for direct war production only, of necessity provides a changing index of the essential nature of the work under consideration. Without attempting a listing of treatment plants eligible to preferential rating, it can be said that heretofore it has been necessary to support applications by showing that the proposed works contribute directly to community health or morale or have a close relationship to a war industry or to a military or naval establishment. In the essential category are plants for the numerous new communities which have sprung up all over the country near industrial plants engaged in war work. The government has designated these towns as National defense areas and has aided in financing the projects. Many treatment plants have likewise been built in recent months in connection with the development of army camps, naval air bases and shipyards.

Aside from the possible exceptions indicated, to start new plants at the present time is contrary to W. P. B. Conservation Order L-41.

Conservation and Substitution

The most logical approach to a thoroughly practical solution of the problem of replacing the materials now diverted to war purposes is frequently found through conservation, simplification, standardization and substitution. The simple and obvious or the ingenious and imaginative application of these basic methods has, up to the present time, prevented the complete curtailment of non-essential activities. They are still productive of desired results in the maintenance and operating fields.

In the construction of the two sewage works nearing completion in New York City under a priority rating, many redesigns and substitutions were found to be necessary. Ordinary reinforcing steel for high tensile steel; plain for reinforced concrete; wood sash and glass block for steel sash; copper bearing pipe and corrosion resisting metals for equipment and weirs in contact with sewage were replaced by less satisfactory substitute materials, and so on, including many materials normally considered essential to operation and maintenance.

Some Substitutes Are Here to Stay

Not all substitutes thus far used are expected to give equal service or durability, as some were utilized solely on an emergency basis. In general, however, the success which has attended the use of many substitutes for less abundant materials gives promise of many new products to be available for normal use after the emergency is past. Many of these materials have outperformed the materials they have replaced and have made for themselves an established niche. Through improvisation and scarcity numerous products of organic chemistry will later be available.

Of closer application in the daily experience of the engineer and operator in the sanitary field are the advances which provide new raw materials, plastics, oils, pigments, resins, special alloys and metals, and in the new emergency applications and processes developed with their aid.

New York's Recent Experiences in the Construction of Sewage Works

New York has five major treatment works in the construction stage. These plants, being built under the jurisdiction of the Department of Public Works, have a combined design capacity of 201.5 m.g.d. and are estimated to cost $18,500,000. They are the Bowery Bay works of 40 m.g.d. capacity; the Jamaica Works of 65 m.g.d. capacity; the 26th Ward plant of 60 m.g.d. capacity—all activated sludge plants; the City Island-Hart Island primary plant of 1.5 m.g.d. capacity, and the extension to the Coney Island Chemical Treatment Works of 38 m.g.d. capacity.

The City Island and Bowery Bay plants are now essentially completed although they were delayed due principally to inability to get electrical equipment. In both cases priorities on individual items aided in securing these restricted materials.

Of the three plants under construction on Jamaica Bay, the Coney Island Extensions and Jamaica works were started early in 1940. In June, 1941, a blanket priority was obtained for the completion of these plants and also the 26th Ward plant, at present in the early construction stage.

Two important reasons supported this application—the reduction of pollution in Jamaica Bay is important to the operation of two government airfields on this body of water, and, further, as a community health measure because of the desirable recreational use of the bay. Favorable action on this application enabled these plants to move ahead under a B-1 rating. This, however, has not been sufficient to prevent numerous delays in obtaining materials and equipment, which so far have amounted to over eight months. It is hoped that the first mentioned plants may be put into service about the middle of the year. No completion date can be set for the 26th Ward plant, which only recently got under way.

No attempt was under consideration to start any new construction under present circumstances. Instead, the design program looking to the future has been considerably stepped up in anticipation of a coming construction program under which a total of 18 plants at an aggregate cost of $183,000,000 are contemplated to treat New York's sewage.

Local Public Works Programming Office

Programs advanced by Congress and other governmental bodies for the "post war" period have been quite fully reported in recent months by the press and the radio. In efforts to avoid the economic, industrial and agricultural dislocations experienced in the two decades following World War I, the Federal government has already instituted certain controls which it is hoped will do much to take up the slack in the Nation's economy in this post war period of changeover.

The rapidly tightening restrictions on municipal and private enterprises not vital to war or war production can have only one reasonable result. In fact, we may say one outstanding result is now apparent—to wit, capital improvements in most cases must wait for the post-war period, when a dual purpose is to be served.

Out of efforts to evolve a practical plan free from the proven shortcomings of former post-war efforts, the Public Works Reserve was developed. It operated through the facilities of a W. P. A. project sponsored by the Federal Works Agency and by the National Resource Planning Board.

Early in April a new advisory unit known as the Local Public Works Planning Office was created to replace the Public Work Reserve. The new unit is attached jointly to the office of Federal Works Administrator and to the Public Works Planning Division of the National Resources Planning Board.

It differs from the old body in its more realistic approach to future planning. This feature is emphasized by its aim to encourage local governments to draft a six year plan of public works which may be undertaken with its own funds and without regard to possible Federal aid. An annual revision of the local six year plan is expected to enable it to continuously reflect the changing needs of the community. The willingness of the local community to carry out with its own funds the projects in the six year plan is regarded as a valid test of the desirability of such projects.

What Is to Follow?

To really win this war, the United Nations must also win the peace. Useful planning for the post-war era is not to be regarded as something apart from the war effort, but as a continuation of the effort itself.

A fertile and unlimited field for research and development and for the practical application of the results of these explorations lies before us as a part of the general pattern of future planning.

We in technical, scientific and allied activities readily picture these developments in terms of new methods or processes in our particular fields, of new materials and of well known materials in new applications. Vieing for recognition with the advances of applied science are the social, economic and governmental progress which even now is shaping a new world—a world we visualize as one of peace and democratic independence.

WHAT DEMOCRACY MEANS TO ME–

N. J. DAMOOSE
Director Public Services
BATTLE CREEK, MICH.

THE deeds of a man, his achievements, the experiences he encounters over a span of years, constitute that man's career. While we observe our own birthdays and celebrate those of our great men, it is seldom that we regard birth, in itself, as transcendental—or the most significant incident of any life.

But let me say to you at this very beginning, and with all sincerity and earnestness, that the greatest event in my life, the most vital incident in my career—the experience about which my very life began and will end—is the experience of having been born an American.

The Author

Recall the thrills of your first glimpse of an ocean liner, the Grand Canyon, the Washington Monument; combine these with the tingling pride that swelled in your heart when you trod upon or read about the sacred greens of Lexington and Concord and the exquisite delight of your first opera or symphony; then add that never-to-be-forgotten moment when a sensational play on the field of rivalry won for your *alma mater*. And now, if you could, by some supreme power blend and season these with the element of perpetuity to give them everlasting life, you might then achieve an emotion that would be akin to the feeling I enjoy at the mere thought and realization that I am really and truly an American. Let me assure you that this is not a recent attitude nor one provoked by troublous and hectic times. It is indeed the perpetual inspiration of my life.

Why Should I Defend the American Way of Life?

I propose to tell you today what democracy means to me and at the outset I wish to say that it grieves and yet infuriates me to think that I, or anyone, should find it necessary to come before you to extol, justify—yes, even to *defend* democracy as it is represented by what has come to be termed "The American Way of Life."

Think of it! After 150 years of freedom and liberty, the like of which the world has never known; after 150 years of progress that is still incredible; after an age of a constant and ever-rising standard of living that makes our country and our philosophy the envy of mankind, we find it necessary to justify and defend our American way of life—to justify and defend the merits and virtues of our most priceless heritage, the noblest of all conceivable ideals, the very breath and blood of every American.

To defend or justify oneself at once implies that he is challenged. To defend an ideal likewise infers that it is challenged. Our democracy has been challenged! To me this is not only despicable, not only base ignorance, not only a depraved abuse of our constitutional franchise, but a sin and a crime perpetrated by an ungrateful and disloyal few against the great mass of 130 million true Americans. In my opinion, the slightest inference of a subversive or radical criticism of our form of government constitutes a moral and legal justification for the immediate eviction of such persons from our midst. They should and must be eternally denied all of the liberties and privileges bestowed upon them by birthright or naturalization.

Just How Far Should "Freedom of Speech" Go?

For years you and I have known that some of our people, having suffered personal reverses and misfortunes, have also lost faith and have become somewhat disillusioned. Upon these fertile souls have fallen the preachments and propaganda of foreign ideologies. Not merely by indirection but with malicious deliberation have our unfortunate compatriots been exploited. You and I stood by, listened to these attacks upon our form of government, shook our heads in quiet disagreement and passed on without the slightest attempt to nullify them and thus restore lost faith. By our very silence we not only have permitted the damage to be done but condoned it, if you please, and soothed our guilty conscience by saying, "Well, after all, this *is* a country of inalienable rights and freedom of speech."

But it is well to ask just how far should this freedom of speech be allowed to go? Can it be sanctioned to the point of destroying our institutions and demoralization of our people? These foreign encroachments have had a devastating effect, whether we like to admit it or not. Witness the scores of anti-American organizations and activities that have been disclosed after running rampant throughout the country far too long. Let me refer you to articles and editorials in the nation's journals and more especially to two in the December and January issues of *The Reader's Digest*. However great the damage that has been done, it will be resolved to insignificance when compared to what we may expect after the war.

I do not intend to be an alarmist—I merely want to be certain that we will not make the same mistake twice; that we will be more conscious of what goes on

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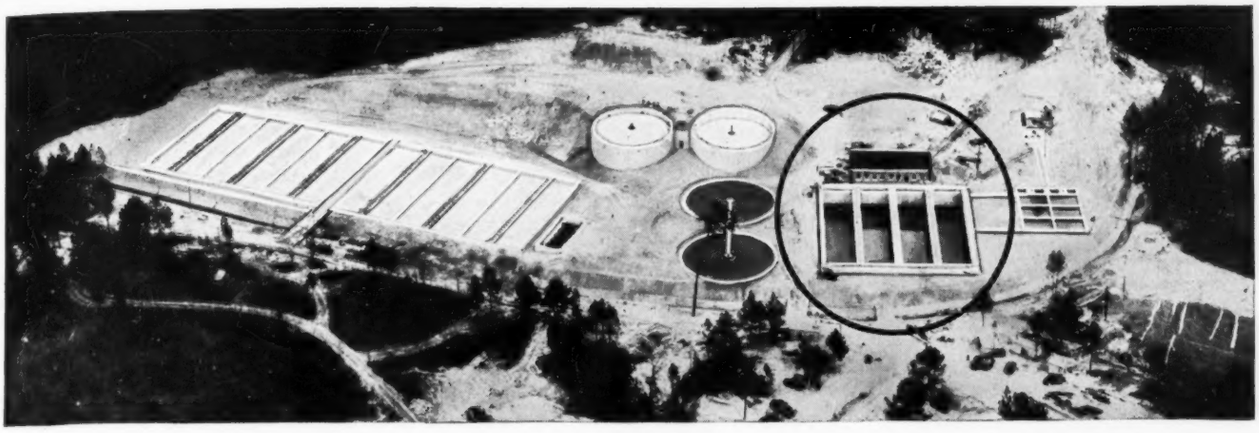

Camp Shelby, Miss., Activated Sludge Sewage Treatment Plant for 55,000 Soldiers. One of the Largest Camps in the Country. Aeration Battery with "Chicago" Swing Diffusers for Operation on the Tapered Aeration Principle in Circle. Photo by U. S. Army Air Corps.

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SUMMARY OF OPERATING DATA

Mo. 1941	Sewage Flow M.G.D.		Aeration Hours	5-Day B.O.D —P.P.M.			Suspended Solids —P.P.M.		
	Max. Rate	Average Daily Flow		Raw	Final Effluent	Per Cent Reduction	Raw	Final Effluent	Per Cent Reduction
June	8.6	5.37	5.7	167	13	92%	182	5	97.5%
July	13.9	7.09	4.4	197	19	90.5%	203	8	95%
*Aug.	11.4	4.23	8.0	138	7.6	94.4%	145	6.2	95.6%
*Sept.	9.4	2.54	10.0	146	4.3	97.2%	185	5.8	96.7%

*Troops on maneuvers Sept. and part of Aug.

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(Top) Heavy motor trucks rumble over this bridge day and night. The heavy vibration has no effect upon the *Tegul*-MINERALEAD joints of this Reading, Pa., cast iron water main.

(Bottom) Diameters, large and small, look alike to *Tegul*-MINERALEAD; 2", 48" or anything in between, is handled with equal facility. Compound is poured through "gate", which is later chipped off.

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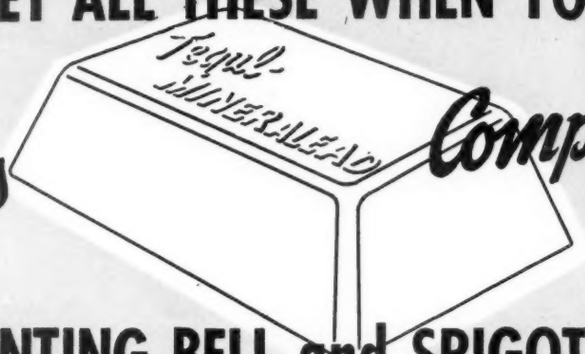

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about us; that we will abandon the false security that comes from *taking things too much for granted;* and that we will have a deeper sense of gratitude for the privileges that are ours. You see, I know the tragedy of life under totalitarian rule. After 3740 years it can't help but be imbedded in my very being—so much so, in fact, that I still can't believe that so many of the privileges that I enjoy *are really mine.*

If, unfortunately, it had been my lot to have been born in Syria, and if I had been able to survive and my father attempted to send me to school or somehow helped me to read and write, both of us would have been liquidated forthwith. In contrast, here in America the law would have put my dad in jail if he tried to keep me *out* of school. In Syria, too, if I wished to visit some distant point 50 or 100 miles away I would have had to be convoyed by my friends and relatives armed to the teeth with stones and clubs. The moment we reached the outskirts of town, had we managed to get by the local police, the family posse would have been scattered to the woods by privileged Bedouins, and those of us that survived would have hidden for weeks before attempting to return to our homes and families. In America millions of dollars' worth of radio time, newspaper advertising and circulars are employed throughout the country to invite us to visit every corner of the land.

I can step into my car, get out on a beautiful ribbon of highway, which is all mine to use, mind you, and travel thousands of miles for a change of scenery and a rest. On my way I pick up stickers that inform representatives of the law that I am a tourist and he waves me on with a smile. When I get to my destination, the law puts a sticker on my windshield advising their officers to leave me alone, even if I do park too long, because I am a visitor and entitled to every courtesy. Simple, little every day occurrences in the life of the average American, aren't they? Yet, *ponder their significance.* Think what they really mean. Can we afford to go on taking these privileges, and all that they imply, for granted? Let's re-awaken our sense of gratitude and re-animate our thankfulness for the blessings we enjoy. If I can do no more than help, in a small way, to reinspire some listener—if I can't do any more than call your attention to a grave danger which exists and solicit your concern, then I shall feel justified in occupying your attention here tonight.

May I Become Personal for Just a Moment?

What I have said or intend to say about democracy and its meaning to me is not new. I do, however, hope to present it from a different, perhaps an entirely new viewpoint, and to do this I must necessarily make a personal reference. For this I plead your indulgence. I may make known to you certain facts which, in themselves, may seem boastful, but I urge you to withhold judgment until their true significance is apparent.

I am an American, born in Toledo, Ohio, of Christian Syrian parents. They tell me that my identified family is the oldest and largest in Syrian history. Its age is counted in thousands of years. I personally cannot confirm this except to say that there are well informed members of my family who assure me of the authenticity of this claim. Certain it is that my family's age antedates Christianity, for my ancestors were the "Arabs of the Desert." Their conversion to the faith of Christ came with his birth, which occurred almost within walking distance of their natural home.

Their history reveals that any positions of prestige or honor, any offices granted to a dominated and oppressed people by tyrannical rules were invariably conferred upon my family down through the centuries of its existence. Even at the present time one of our people holds a high office in the new Free French government of Syria. Many villages and towns in this ancient country were established by them and that one from which my parents migrated takes its name from its only industry, hand-made pottery. My immediate family established this industry hundreds of years ago and they still deliver their wares to nearby Damascus by that ancient means of transportation—the donkey or burro-pack.

The Syrian has made definite and undeniable contributions to our civilization and culture. It was the Arab who gave us the numerals which are so vital to us today. They gave us our basic principles of geometry and astronomy. Three great religions had their inception in the Holy Land—the land of my ancestors. It was there that Moses was born and Jewry had its beginning. It was there that Mohammed received his visitation, and then, in the midst of my people, possibly in their very presence, was born the greatest man who ever lived.

With this brief history of these people, keeping in mind the age and extent of this family, contemplate this fact: In all those thousands of years, in spite of its honor and integrity, in spite of its prestige and favorable recognition by despotic rulers, no member of my family, not one of my ancestors, ever enjoyed even a day of true liberty and freedom until my father and a few of his relatives landed in Massachusetts some 40 years ago. At no time in their history before had they lived without fear for their lives. Never had they been permitted freedom of thought or action. By nature, a clear-minded, earnest, intelligent and diligent people, they had never been granted the privilege of promoting their welfare and that of their fellow men. When one had dared to tread beyond a set, meager limit, he forfeited his right to live. Schools were forbidden, every form of education was not only denied but violently suppressed.

The folklore, the music, the song of a nation reflects the life, the state of mind, the progress and contentment of its people. Do you know that I have never heard a happy Syrian song? Would you believe that I never have heard a happy Syrian story? Once, when I was a youngster, I saw my mother crying. She, my father, brothers and sisters and I were seated about the stove in our modest living room. Though I was quite small I recall that things seemed perfectly alright to me; but, upon inquiring about her tears, my mother dismissed me with a kindly gesture that indicated I was too little to understand. I never have forgotten that and as years went by I came to know why she cried. She was not unhappy. Her tears were tears of joy at the thought that her little family was safe. She was sure that a knock on the door or its sudden opening would not admit the agent of an autocratic government bent upon collecting his taxes or . . . in forfeiture . . . a life.

Suppression and oppression of such magnitude, clashing with a deep conviction that a people were meant to survive, together with a profound determination and indomitable desire to so do, cannot but be productive of a sturdy character and a steel-like will in the oppressed. It was this attribute, fortified and inspired by a devout belief in the teachings of Christ, that made it possible for my great, great grandmother to courageously face a Sultan of Turkey and fight for her retention and claim to a treasure found upon her land. It was this same determined will to live that carried my paternal uncle through a life-time of bitter struggle during which he

was provoked to kill seven of his ruthless oppressors, and lives to this day to tell the tale.

Think of it! Here is a man whose ancestors lived in slavery for thousands of years, who himself has merely existed, not lived. Here is a man who loved life so dearly that he could kill seven human beings in defense of that life—not a life of freedom, liberty and happiness, but a life of oppression and virtual bondage. If he found it necessary in his heart to commit this terrible deed for survival alone, then what, I ask you, can we be inspired to do in defense of our democracy and our American way of life?

It was this same relentless will, also, that gave my father the courage to embark upon a search for freedom that he knew could most generously be found only in one country, thousands of miles away. Fully aware of their dire circumstances in their home land and realizing their utter lack of education and worldly goods, I still cannot quite believe that he accomplished his goal and his aim—an achievement that is responsible for my every privilege, every blessing and every possession—the achievement that even makes it possible for me to relate this story to you. Do you wonder any longer, do you understand *now* why I say that my very life began and will end upon the experience of having been born an American?

I Return to One Abused Freedom—Use of the Printed and Spoken Word

Under our great Constitution the right of free speech, the freedom of the press, are granted to all Americans, loyal and disloyal, honest and dishonest. We realize today that this is not quite right. We don't like it, but there is nothing you and I can do about it—everyone has the right to speak his mind and his heart. There are those ungrateful few who feel that life owes them all that you and I work for, acquire and enjoy. Because, by their own lack of initiative and effort, these things are not forthcoming, they exercise their rights under our constitution to undermine that sacred and glorious instrument. We cannot take the law into our hands. We cannot exercise the violent resistance and suppression of the tyrant—it is not the American way. How shall we protect and defend American democracy? How shall we, how *can* we, combat the attacks that are being made upon us today and those that are certain to come? Of course, we have a war to win. This we shall do; there is no question of that. Then there is a peace to win, and I care not how complete this peace will be between nations and peoples, it will fall far short of being consummate if we do not make it secure here at home—if you and I do not start *now* to meet the inevitable and envious challenges that will be thrust upon us.

The success of anti-Americanism cannot be denied. It has been achieved by underselling democracy through the medium of the written and spoken word—by a constant and persistent campaign of talking it down. Our only recourse against this, our best and only defense, it seems to me, is to defeat them at their own game. We can *talk it up* as they talk it down. We can talk and sing our gratitude for our *Magna Charta* as our own unscrupulous dissenters and their "friends" violate its privileges to treacherously malign it. The die has been cast. The game has been identified, the playing rules have been adopted, and the objectives sighted. From here on in let's never again cease our vigilance. Let's reawaken our gratitude for the blessings which are ours. Let's talk it up!

Liberty Has Become Too Commonplace

The first time I attempted to record my thoughts on what democracy means to me I found to my amazement that I was at a loss for words. I sought ideas from my friends but their replies were hesitant or incoherent, and I wondered why. Soon it dawned upon me that democracy was so fundamental and so integral a part of American life that we have come to *take it for granted* as we do the sun, the moon, the stars and the elements of nature.

How inescapably true it is that the simplest, the most common things in life are the most beautiful and the most valuable, however much we take them for granted. Imagine our living without the sun, the rain, the plants of the earth—imagine our living without democracy.

They say that the shrines of a people are the revelation and the evidence of that people's soul, and what shrines we Americans possess! What a heritage is ours to worship! What a priceless gift has been handed down to us, to acclaim and to uphold before the entire world! Let's review this legacy of ours. America's beginning was a noble one indeed, inspired as it was by an unyielding desire to preserve the philosophy of life as decreed by the Son of God. Upon this great principle, upon this Gibraltar of ideals, America was conceived and America has grown. Trials and tribulations, suffering, privation, doubt, fear and dissension are only a few of the ingredients that were molded together to form the cornerstone of American liberty. To these were added the very life-blood of our pioneers and thus was cemented into eternity the indestructible foundation of American freedom. Only by divine inspiration could America have been conceived, and certainly by divinely inspired Americans has our great land nurtured.

Jamestown, Plymouth Rock, the Minute Men and the Green Mountain Boys; Bunker Hill, Lexington, Concord, July 4, 1776, and Yorktown; Washington, Jefferson, Lincoln. What a glorious lineage! What a cavalcade! What a deep and reverent pride beats within our hearts at the very thought of these milestones in the American pattern of life. What great significance they reveal *NOW* in this crucial time.

What Is This Thing Called Democracy?

Democracy? Does this require precise analysis? Does it need microscopic examination to lend it clarity? Can you describe, can you explain your faith in your religion? Can we fathom the mystery of life?

A great French patriot was once asked how long the New Republic would endure, and his reply was: "The American Republic will endure so long as it remains true to the principles of its founders."

In this terse version is the very essence of our democracy, the Alpha and the Omega of American life; the beginning and the end of its existence and survival. Here is that binding media, that life-blood of our pioneers, so dearly shed that the ingredients might forever withstand disintegration. If we can remind ourselves of these facts, if we will but revive their significance, if we will but make them a part of our creed, we, too, will repeat and utterly believe what a great American saint once said: "A nation so conceived and so dedicated cannot perish from the earth."

Defend democracy? All it needs is your eternal faith and mine; your eternal vigilance and mine; your eternal worship and mine.

The dictators and devotees of a New World order have subsidized the spread of their philosophy through-

out the world. Their contemptuous attacks have been so successful that the only surviving democracy in the old world is fighting for its very existence, and that of the new world, yours and mine, is direly threatened. These mad men have directed their demoralizing influence against our faith in the true brotherhood of man. They are attempting to destroy our confidence in those principles upon which humanity has made its greatest strides and achieved an unprecedented state of progress. Their emissaries tell us that this philosophy of ours, which guarantees complete and free personal expression and effort, has become a menace to human progress; that it creates a society wherein man, given these privileges, does not cooperate with his fellow man for the public good but rather exploits his neighbor for material gain and self-exaltation; that our form of government encourages class-consciousness and glorifies selected minorities; that the processes under a democratic society are slow and unwieldy, and therefore our system is incompetent and extravagant; and, finally, that this pattern of life which you I have proclaimed to the universe, the ideals which constitute mankind's one remaining hope in a despairing world, are obsolete and doomed to failure and oblivion.

What base and contemptible ignorance. What utter and profound stupidity. What a vicious and all-consuming madness it must be to provoke so false an evaluation of an order which permits me to do *just as I please* —a system which enables me to provide my family with its needs and desires under limitations of personal capacity alone and not, in the slightest degree, subject to allotments or rations dictated by the state. How deeply comforting it is to realize that I may go and come as I like, at any hour of the day or night, in perfect security, and not only without fear but with the protection of the officers of the state. How unbelievably happy I am to exercise my birth-right, to express my choice of state officers at my own free will, and not at the point of a hidden or implied bayonet. Why! If I wish to, I may criticize those who occupy the highest offices in my government. I may challenge and attack any issue, I may say *what* I please, *when* I please, *how* I please, being restrained only by my sense of good taste, propriety and a normal degree of human decency. Yes, you and I may do all this and ever so much more without the fear or threat of the concentration camp or the firing squad.

You and I chose our own school, selected our own studies and prepared for the profession or trade we liked best—not that which suited the convenience of the state. The only part *our* government played in our education was to see to it that numerous schools were available to us and that every inducement and encouragement was provided us to attain that which would make our lives and our work a little easier.

You and I may worship in any church we may wish to. We may subscribe to any newspaper or periodical that strikes our fancy and we may expound our theories on *any* corner of *any* street in *any* city in the nation, and the only fear we need have is that of a listener who disagrees or becomes offended—and, *of all things*—if he becomes too violent and attempts to do us injury, the state will provide us with protection and will likely incarcerate him.

What is it that makes all this possible? What intangible power constantly assures and reassures us of this incredible and endless range of freedom and liberty? What omnipotent force keeps driving this element of security home to us so resolutely that we have come *to take it so for granted?*

How is it that you and I can hear and read about human want, suffering and tragedy in almost every corner of the earth, extend our sympathy, dispatch material aid, and then quickly heave a wholesome sigh of relief and mutter to ourselves: *it can't happen here.* This is the United States! We're in America! We're different over here somehow! Something entirely apart from any element on earth protects us! We're safe.

In my humble opinion, this security comes to us wholly and entirely through divine providence—a divine providence which has placed in the soil of our land the abundant nutrition and food which our bodies need—it is the providence which guided and protected our forefathers, established this Utopia of ours and preserved it through every crisis in our history—it is that guiding spirit which has placed in the hearts and the minds of free men everywhere the hope, the desire, the need for freedom, salvation and happiness.

So long as you and I believe this; so long as we merit the heavenly confidence inspired by our forefathers; so long as we glory in the privilege of worshipping at America's sacred shrines and have implicit faith in the principles which created them; so long as we restore, remain and perpetuate our own loyalty and patriotism for future generations to emulate—then so long will America and her free institutions survive and our posterity be secure.

As for me, I welcome this opportunity to give audible expression to a silent prayer which I constantly and will forever repeat—I thank almighty God that I am an American!

Some of our readers may consider it strange to find in a technical publication an article of the nature of this one. However, in running this philosophic discussion of a topic which cannot help but possess high interest at this time to everyone, we have three valid excuses.

First: The author of "What Democracy Means to Me" prior to his recent elevation to Director of Public Services, by an administration to be commended on its appreciation and recognition of career service, was Battle Creek's Superintendent of Sewage Treatment.

Second: The paper was delivered in the form of a stirring and inspiring address before the Michigan Sewage Works Association, which the author represents on the Board of Control of the Sewage Works Federation.

Third: This paper, which began as a "pinch-hitting" talk before Battle Creek's Rotary Club, brought 137 Rotarians to their feet, and has since been given by popular demand on 83 other occasions, and has also been extensively reprinted.

While we would say that any one of the three reasons for giving "What Democracy Means to Me" to readers of "Water Works and Sewage" would be ample, we are of the opinion that Naseb Damoose's inspiring and well told story rather stands on its own. So much do we believe this, that we feel that every reader will feel the same way about it—and make the suggestion that here is an issue which every father can well take home for his entire family to read.

LONG ISLAND SECTION MEETS

To Hear About Defense Plans—and to Learn That It Is Losing Its Organizer and Perpetual Secretary for the Duration

MORE than 50 members of the Long Island Section of the N. Y. State Sewage Works Association attended a dinner meeting at Hempstead, L. I., on May 7th to learn that Larry Luther, the Section's organizer and jovial and hard-working Secretary, and Vice President of the parent association, is accepting an assignment with the American Red Cross for the duration of the war.

Mr. Luther was unable to say where his assignment would take him but it would of necessity require his leaving Long Island and giving up the secretaryship of the Section.

Marked regret was expressed by many members of the Section but they all realize that the loss to the Long Island Section and to the many activities which Larry is interested in was by the same token a means by which the American Red Cross and the Government would receive a great asset. A glowing tribute was made to Mr. Luther by his Commissioner of Public Works and friend, Frank Holland of Freeport, who spoke of Larry's unselfish and unstinting efforts, not only for the Sewage Works Association but for many civic and patriotic activities, including his services as Chairman of the Selective Service Board of Freeport.

Seth G. Hess
(Principal Speaker on Defense Program.)

L. L. Luther
(Long Island's Loss Is Red Cross' Gain.)

The business meeting was confined to the election of three members to the Section's Board of Directors—namely, Henry M. Rath of New York City, Arthur H. Herberger of Freeport, and George Welsch of Riverhead.

Speakers

The guest speakers of the evening included Colonel Edward C. Thomas, Director of the Nassau County War Council; Seth G. Hess, Chief Engineer of the Interstate Sanitation Commission; and Fred Welsch of the Department of Public Works, Nassau County.

Colonel Thomas outlined the activities of civil protection. He emphasized that the work of the War Council in civilian protection was merely an extension and enlargement of existing offices, forces and facilities. With the exception of the Air Raid Wardens, there are practically no new activities undertaken in civilian protection. The duties of many agencies are materially expanded and the Colonel described how the auxiliary fire and police services were being developed. He spoke of the blackouts and dimouts which were being carried on so successfully in Nassau County and on Long Island in general.

DEFENSE MEASURES FOR SEWAGE WORKS

By SETH G. HESS
Chief Engineer
INTERSTATE SANITATION COMMISSION*
NEW YORK CITY

[Ed. Note: Although Mr. Hess spoke only from notes, he has at our request put his talk in written form for reproduction in WATER WORKS AND SEWERAGE.]

Defensive measures as applied to sewerage system and treatment plants must protect such works against sabotage as well as damage from aerial bombardment. However, it seems unlikely that sewage works will receive the attention of foreign agents attempting sabotage because their efforts can be more effectively used elsewhere.

The plant operator and superintendent are sufficiently acquainted with their plant and system to know the points which are most vulnerable and where the greatest amount of damage could be done by the saboteur. By carefully listing these vulnerable points, the means of defense and protection become almost obvious.

The damage might result in the pollution of potable water supplies or in the flooding of important manufacturing plants, areas or services.

Although one should not go "witch-hunting," those responsible should insure themselves that the employes in charge of vulnerable points are trustworthy. Registration cards for employes might include name, address, age, place of birth, citizenship, place of birth of parents, cities in which employe has lived the last five years. In small organizations, even this information is probably unnecessary.

*Representing the States of New York, New Jersey and Connecticut.

Protection of Vulnerable Points

Having determined the vulnerable points, the means of protection against sabotage might include encasement, fencing, flood lighting and policing.

Protection against actual attack may include physical protection by encasement, bricking up openings of walls, etc., duplication, spare parts and organization for rapid repairs.

Again it is unlikely that sewage works would be the target of aerial attack; however, they may be mistaken for other types of plants, and, furthermore, from the air they appear to be attractive targets.

For physical protection, one might review some of the government manuals which have been issued, particularly the one, "Protective Construction—Structural Series Bulletin No. 1," prepared by the War Department, as well as the "Memorandum on Protective Construction" from the Office of Civilian Defense, and the "Protection of Industrial Plants and Public Buildings," also prepared by the Office of Civilian Defense.

Duplication of spare parts should be confined to those very special articles which cannot be readily replaced. One must be cautious not to build up a large reservoir of unnecessary reserve parts. A nice balance must be maintained between what is necessary and what is to be considered hoarding. One of the obvious needs is a secondary source of power as well as a secondary source of light in the sewage treatment works and pumping station.

Some Form of Mutual-Aid Plan Desirable

The ability to rapidly repair any damage is probably the most important phase of the protection scheme. A careful inventory of all materials available and materials necessary is of primary importance. A complete inventory of equipment and tools as well as man power is a part of this scheme. Some arrangements should be made for the interchange of this information between nearby municipalities. In New York State, Maine, Massachusetts and other States the water works have already been organized along this line, and we understand that more recently the sewer departments are being organized along similar lines.

Contractors and their equipment become an important adjunct or auxiliary to the regular forces. In general, sewer departments are not as well prepared for emergency repairs as are the water departments. The sewer departments should, therefore, carefully organize an auxiliary whereby they would have at their disposal construction equipment such as excavators, pumps, bull-dozers, pavement breakers, and the like. The operators for all of this equipment must also be very carefully listed and made available. In this connection it is to be stressed that emergencies very frequently occur in the dead of night. Although it is not expected that a sewer will have to be repaired in the dark, certain emergency steps must very frequently be taken. It may be necessary to block off the flow or to prevent the discharge from a broken sewer from entering a potable water supply. One must be prepared for this type of emergency work. Furthermore, the necessary contractors' equipment and gangs should be so organized that they will be available the first thing in the morning following the damage.

Items to Consider

Ingenuity becomes a most valuable asset in the event of damage by aerial bombardment. Several items which may be anticipated in a sewage treatment plant include:

1. The control of damaged chlorine cylinders.
2. Means of applying disinfectant in the event that chlorinators are damaged.
3. Means of applying disinfectant at various points throughout the system.
4. Preparation to modify the type of treatment by reducing sedimentation time, etc.
5. Means of taking care of sludge in the event that digestors are damaged or put out of commission.
6. The use of settling tanks for sludge storage.
7. Makeshift sedimentation by using any available excavations or even bomb craters in the vicinity of the plant.

Notwithstanding the fact that many pumping stations are small targets, they are nevertheless vulnerable and a source of much trouble. The following should receive consideration:

1. Protect building and machinery against splinters.
2. Fire protection.
3. Means of by-passing pumps or damaged treatment plants.
4. Means of disinfecting during by-passing.
5. Auxiliary power.
6. Auxiliary pumps.
7. Portable pumps.

Emergency Equipment, Tools and Repair Materials

There is furnished herewith an inventory of the contents of the emergency truck of the Joint Meeting of Essex and Union Counties in New Jersey, as well as a list of the essential tools, equipment and materials for repair of sewers. They may serve as a check list to determine what additional tools, equipment or material may be necessary.

One must not fail to disperse the various materials and equipment throughout the municipality, being particularly careful to avoid placing too much material in the vicinity of either the treatment plant or the pumping station.

Since repairs must frequently be made where bomb craters occur, the pipe may have to be laid on fresh backfill. Extreme caution must be exercised in puddling the backfill and properly tamping it, as well as using such additional foundation facilities as may be required. It is well to consider the value of "Transite" or metal pipe for additional strength in carrying over bad foundations. Abroad repairs are in general permanent in nature. Seldom are temporary repairs made below street grade.

Those responsible are urged to review the system under their control and attempt to visualize what will be necessary should any one part of that system be made inoperative. Reasonable plans can then be made in advance to take care of such a situation.

Under the present conditions, eternal vigilance is not enough. It makes little difference why we lose the use of certain public utilities, whether it be through carelessness, sabotage or aerial bombardment. Their failure to operate, whatever may be the cause, is the enemies' objective. The fire on the Normandie, which resulted in that ship being out of service, was just as effective as though the enemy had bombed the ship. We must, therefore, guard against not only aerial bombardment, but sabotage and carelessness as well.

We must take preventive steps so that these things cannot happen and we must not have merely eternal vigilance but we must apply aggressive vigilance.

[In discussing Mr. Hess' paper, Mr. Fred Welch, Chief Engr., Nassau County Dept. of Public Works, called attention to the move by the State Dept. of Health in the direction of organizing Sewer Departments for civilian protection.—Ed.]

Contents of Emergency Truck

Joint Meeting of Essex & Union Counties of N. J.

1 Line Level
5 Pairs Safety Glass Goggles (for chipping concrete, etc.)
3 Carpenters' Saws 1—24", 2—28" rip and cross-cut
1 Pistol-grip Hack Saw
1 Keyhole Saw—16"
1 10 oz. Brass Plumb Bob
1 Stanley Combination Square—18"
1 Spirit Level—24"
1 Spirit Level—28"
1 Carborundum Sharpening Stone—1"x2"x7"
1 Steel Framing Square—16"x24"
1 Steel Square—8"x12"
1 Carpenter's Steel Square with wooden handle—4"x9"
3 5-cell Eveready Focusing Flash Lights
2 2-cell Eveready Water-proof Rubber Flash Lights
12 Extra Batteries for Flash Lights
6 Extra Flash Light Bulbs for 2 & 5-cell lights
1 Portable Electric Lantern—#6 Harris Bros.
2 Extra #6 Batteries for the above lamp
3 Mirrors—18½"x13½"
1 Stanley Block Plane—2"x6"
1 Stanley Wood Plane—2"x14"
1 Bit-Brace
1 Portable Red Diamond Hand Grinding Wheel
1 Davis Inhalator, with Oxygen Tents
1 Wolfe Oxygen Deficiency Lamp
1 Single Pulley (metal)—5"x12"
15 ft. 2" Link Chain
6 ft. 2" Link Chain
1 #10 Gauge Malleable Iron Wire—35 ft. roll
1 #16 Gauge Malleable Iron Wire—50 ft. roll
1 Davis All Service Gas Mask with Blower, for 2 men
1 Davis First-Aid Kit
3 Dupor Rubber Respirators Canisters
24 Filter Pads for the above
12 Face Cloths for the above
1 Mine-Safety Hydrogen-Sulfide Detector
1 Davis Combustible Gas Indicator
200 ft. Wooden Sewer Rods—3 ft.
500 ft. Flexible Sewer Cleaning Rod and necessary attachments
1 Quart Pyrene Fire-Extinguisher
1 Steel Measuring Tape—100 ft.
1 Steel Measuring Tape—50 ft.
1 Ax with 18" Handle—6"
1 Ax with 18" Handle—7"
2 Half-Pint Oil Cans
1 Wrecking Bar—30"
2 Wrecking Bars—24"
1 Wrecking Bar—18"
3 Manhole Hooks—¾x20"
3 Hydrant Wrenches—¾x18"
1 Assorted Rubber Hose Washers—1 box
1 Assorted Wood Screws—1 box
2 Spanner Wrenches—12"
2 Spanner Wrenches—11"
4 Hydrant Adapters—2½"
1 Hydrant Adapter—2"
1 2½" Brass 15" long Shut-Off Hose Nozzle
2 Traffic Safety Stands—4"x26"
8 Traffic Flags—20" long
8 Traffic Signs—15"x15"
8 Wire Brushes—1"x12"
2 Wire Brushes—2½"x8"
1 Telephone Gas Mask Set Complete
3 Brick Laying Trowels—9"
1 Set Sidewalk Masonry Tools
1 Brick Hammer—8"
2 Cork Floats—12"
1 Steel Float—12"
1 Bale Hook—12"
1 Sewer Spear—42"
5 Galvanized Pails—14 qt.
1 4 Prong Sewer Hook—52" long
1 3 Prong Sewer Hook—48" long
1 Steel Garden Rake—5½"x15"
1 Mason Hoe—5½"x9"
1 Standard Size Breast Drill—14"
1 Set of Wood Chisels—¼"-½"-¾"-1"-1¼"-1½"
1 10" Goodell-Pratt Automatic Drill
1 Van Dorn—110 Volt Heavy Duty ½" Electric Drill
24 Keyhole Saw Blades
1 14" Half Round File
2 12" Half Round Files
1 7" Half Round File
3 12" Flat Files
1 9" Flat File
1 7" Flat File
1 5" Flat File
7 Wood handled Screw Drivers—5"-6"-8"-9"-11"-14"-16"
1 Cutting Pliers—7"
1 Cutting Pliers—6"
1 Gas Pliers—6"
1 Tin Snips—7"
1 Tin Snips—12"
1 Auger-Bit—(1"x16")
1 Set of 13 Wood Drills—¼" to 1"
10 Star Drills, Sizes—1"x18" — 1"x12" — ⅞"x11" — ⅞"x8" — ⅝"x11" — ½"x18" — ½"x12" — ½"x9" ½"x8"
2 Carpenter Hammers—12"
3 Machinist Hammers—12"
32 Steel Chisels, various sizes—⅞x8 — ¾x12 — ¾x7 — ½x6 — ⅜x5 — ⅝x6 — 1x12 — 1x7 — 1¼x16 — 1¼x10 ¾x18
25 Bullpoint, sizes—1¼x20 — 1¼x14 — 1¼x12 — 1¼x10 — 1⅛x15 — 1⅛12 — 1⅛x11 — 1⅛x9 —1x18 — 1x12 — 1x9 — 1x28 — ¾x11 — ⅝x18 — ⅝x10
1 Sledge Hammer—12 lb.
1 Sledge Hammer—10 lb.
2 Sledge Hammers—5 lb.
4 Sledge Hammers—4 lb.
2 Grub Ax and Handles—16"
4 Pick Axes with Handles—20"
1 Bolt Cutter—3 ft.
1 Hoe & Handle 4" x 6 ft.
1 3" Ax with 3 ft. Handle
2 Brush Hooks with 3 ft. Handles
3 Folding Rulers—6 ft.
1 Stillson Wrench—2 ft.
1 Stillson Wrench—18"
1 Stillson Wrench—14"
1 Funnel—6"
1 Funnel—10"
1 Walker Hydraulic Jack—3 ton
1 Nail Box (9"x25") with assorted nails
1 Mitre Box—18"
1 Set, Williams Socket Wrenches
1 Steel Tamper—6"x5 ft.
2 10" Square Shovels with 3 ft. handles
3 9" Round Nose Shovels—3 ft. handles
1 10" Round Nose Shovel—5 ft. handle
1 10" Square Shovel—5 ft. handle
2 Corn Brooms—4 ft. handles
3 Steel Crow Bars—1"x5 ft.
1 Push Broom—18"—5 ft. handle
2 50 ft. lengths ¾" Emerald Cord Hose
2 25 ft. lengths ¾" Rope for Lifting
1 ½" Block & Tackle with 100 ft. first grade Manila rope
100 ft. 1" Manila Rope
100 ft. ¾" Manila Rope
1 Canvas Safety Belt with 35 ft. of Manila Rope
1 50 ft. #14 Wire Extension Cord with plugs
1 75 ft. #14 Wire Extension Cord with plugs—for a Portable Elec. Generator
2 50 ft. lengths 2½" Double Jacket Cotton Fire Hose
2 50 ft. lengths 1" Hose for Gas Mask
2 Pr. Rubber Wading Boots
5 Pr. U. S. Royal Storm King Boots
5 ¾ lengths Med. Wt. Rubber Coats
5 Fibre Safety Helmets
2 Pr. 30" Rubber Gloves

Tools, Equipment and Material For Repair of Sewers

(Developed with the Assistance of Mr. Jacob L. Lenox)

Equipment

Compressor, air with jack-hammer, paving breaker, bull points, hose, etc.
Electric generator, portable
Pumps, 3" diaphragms, power
Pumps, 3" centrifugal, power
Respirator
Tar kettle, 200-lb. capacity
Truck, 1½ ton dual tire
Flood lights

Material

Barricades
Brick, common and vitrified
Burlap bags
Cement
Calcium chloride
Drum, 50 gal
Gasoline
Horses, wooden, various sizes
Jointing compound
Kerosene
Lead
Lead wool
Lubricating oil
Lumber, 2x4, 2x10, 4x4, 6x6, #1 com. fir
Manhole blocks
  Heads
  Steps
Nails, assorted
Oakum
Pipe stock depending on system
Plaster of paris
Roofing paper
Sand
Wire, #10 and #16, annealed

Tools

Adze
Axe
Bars, Crow, 5'
Bars, pinch (wrecking), 30"
Block, wood, double
Bolt cutter, #4
Boots, Hip and ¾, assorted sizes
Broom, street
Bull points, ⅞x18"
Chain, assorted sizes and lengths
Chisels, assorted cold
Climbers, lineman's
Digger, post hole
Dipper
Files, assorted
Fire extinguisher
Flag, danger
Furnace, plumbers' gas
Gloves, rubber
Goggles, safety
Hacksaw frame and blades
Hatchet
Hoist, 1 ton chain
Hose, ¾" garden
Hook, brush and handle
Hook, cant
Hammers, ball peen
Hammers, carpenter
Hammers, caulking
Hammers, sledge
Iron, caulking
Joint runner, asbestos
Jack, screw, trench, ass't length
Jack, house
Ladder, extension to 20'
Lanterns, red and white globes
Level, carpenter 24"
Line, mason
Mattocks
Moccasin, wool boot
Pails, 12 qt. heavy galv.
Picks
Pliers, cutting
Plumbing bob
Plugs, rubber expansion, 4, 6, 8, 10, 12"
Pump, canal 10'
Rope, ¼, ½, ¾
Ruler, folding 6'
Saws, hand 26", #8
Saws, 2 man cross cut, 5'
Screw driver, 12"
Shovels, Short, round point
Shovels, Short, square point
Shovels, Long, round point
Stretcher
Tarpaulin, 20x20', 10 oz.
Tool box, portable on wheels
Torches, bomb type
Tripod, 2" pipe
Trowel, 9"
Vise and pipe stand
Wedges, oak, 3"x3"x14"
Wheel barrows
Wrenches
  Adjustable 6", 8", 10"
  Stillson 18", 24", 36"
  Hydrant
  Valve

PACIFIC NORTH-WEST WATER AND SEWAGE WORKS ASSNS. HOLD CONTIGUOUS MEETINGS

A Report by

FRED MERRYFIELD, Sec'y-Treas.*
Pacific N. W. Section A.W.W.A.
and
Pacific N. W. Sewage Works Assn.
CORVALLIS, OREGON

IN SPITE of the many activities of water superintendents of the Pacific Northwest, 201 gathered in Walla-Walla, Wash., on May 8 and 9. to attend the annual meeting of the Pacific Northwest Section of AWWA.

After a brief speech of welcome by our host, Sup't. Richard McLean of Walla-Walla, Fred Jones, Chairman of the Section and Chief Meter Inspector in the Spokane Water Dept., opened the meeting and the technical program, arranged by Jas. E. Morrison, Seattle's Sup't. of Purification (Chairman of the Program Committee), got under way with the new Chairman, Walter J. Moore, presiding.

Papers and Discussion

The old problem of "Water Works Liabilities" was brought before the group by M. S. Campbell, Chief Engineer of the Washington State Department of Health. Although he was vigorously questioned from the floor concerning both his paper and experiences of the several superintendents, he displayed excellent legal ability in interpreting the laws of the State of Washington.

Mr. Tom Judd (Spokane), a member of the Safe Practices Committee, reported on the activities of this committee for Mr. Brian Shera, the Chairman. He pointed out the severe cases of negligence these past few months which had cost this country an enormous loss of man-hours from accidents which might well have never happened.

Mr. Houser of the Seattle Water Department, by means of diagrams, showed how the city of Seattle repairs and replaces its water mains. Considerable discussion took place following these papers, after which adjournment was held until the afternoon session.

Harold Fowler, of Seattle, presided over the afternoon session, at which several papers were given.

T. Guy Eernisse, Engr. of the Tacoma Water Department, read an admirable paper on "Recent Developments in Corrosion Control," which was followed by an excellent treatise on "Asphalt Enamel for Steel Water Pipe" by R. Harsch, of Seattle.

The Walla Walla water system was very briefly described by Mr. McLean and the improvements in the Bellingham Water System were shown by Mr. B. Byron, Water Commissioner of Bellingham, Wash., in technicolor movies.

Further Award to McGuire

The evening session, which was preceded by a buffet supper, was well attended and excellently executed under the chairmanship of Fred Jones.

Alex. Lindsay, Supt. of the Spokane Water Dept., as National Director reported on A.W.W.A. activities, particularly at the Toronto convention.

Wm. P. Hughes, Supt. at Lewiston, Chairman of the George W. Fuller Award Committee, presented to Milton H. McGuire, Mgr. of the Water Dept. of McMinnville, Oregon, the George W. Fuller award.

Mr. C. R. Howson, President of the Association, spoke on the "Needs for Conservation of Waterworks Materials" and the necessity for inventing new devices. His talk was well given and well received.

The Committee on Short School and Licensing of Operators, under the Chairmanship of M. S. Campbell of Seattle, brought up the point of licensing and the lack of opportunity due to war conditions which would prevent such licensing. It was felt by the committee, however, that superintendents should make every effort to maintain personnel and keep up the standards which have been attained.

New Officers

The Nominating Committee reported the results of the election, which were as follows:

Chairman—W. J. Moore, Eugene

Vice-Chairman—C. D. Morse, Seattle

Secy.-Treas. — Fred Merryfield, Corvallis

Trustee — Chas. H. Williams, Lewiston.

Defense Sessions

W. F. White, Chairman of the Session, opened the meeting by calling on Mr. Carl Green, former State Sanitary Engr. of Oregon, to lead off the program. The second day's program was very well integrated, as was evidenced by the opening speaker on the problem of preparation of auxiliary water supply and emergency treatment. Mr. Green went into this matter very thoroughly, and Mr. Groce, special agent of the National Board of Fire Underwriters, pointed out that the Pacific Northwest has been subject to sabotage for many years, and from his varied experience he pointed out the vulnerability of this area and the need for recognition of it by all water superintendents. Although he saw no reason for becoming hysterical over the matter, he appealed for careful planning to combat the saboteurs.

Mr. James Fisken, formerly of the Spokane Water Department, gave an excellent resume of the Civilian Defense System of Spokane as applied to the water works system. This paper drew much applause and many questions until Mr. White was finally forced to call a halt for lunch.

James Morrison (Seattle) presided at the afternoon session, and Mr. Chester Morse, Superintendent of the Seattle Water Department, led off with a Committee Report on "Emergency Defense." By the details of the report it was evident that this committee had been very active.

*Assoc. Professor of Civil Engineering, Oregon State College, Corvallis, Ore.

Major Gerry Arnold, (O.C.D., San Francisco), in commenting on the report, pointed out that much valuable time had been gained in this section. Major Arnold then discussed the Mutual Aid Plan for water service and the necessity for cooperation throughout the Pacific N.W. Section.

MEETING OF THE SEWAGE WORKS ASSN.

As in the past, the Pacific Northwest Sewage Works Association met just prior to the meeting of the Pacific Northwest Section of the AWWA. At the Sewage Works meeting, which was held in Walla Walla on May 7, 95 members and guests were in attendance.

The meeting followed a dinner, with Mr. Carl Forsbeck, City Engineer of Tacoma, Wash., presiding.

Fred Sherriff, of the Dorr Company at Los Angeles, presented a short paper on "Sewage Treatment at Defense Centers in Western States." Mr. Sherriff brought out the difference in the main design factors between defense centers and municipalities. He pointed out that the quantities and loads used in army cantonments were bound to be different from those usually used by municipalities. Similarly, loads used for industrial centers remote from cities presented quite a different picture from either cantonments or municipalities. The increase in municipal facilities in areas where defense activities had contributed greater loads was also another factor which required careful consideration. He believed that these new plants would provoke municipalities, who had done little toward sewage treatment in the past, to action. And that the West in particular would gain considerably from this building of the past year.

Major Gerry Arnold (O. C. D., San Francisco), who spoke both at the Sewage and Water Works meetings, brought out many points connected with wartime protection of sewerage and sewage treatment utilities.

Major R. F. Bessey, of the National Resources Planning Board in Portland, brought out the need for studying of post war planning now. While the construction field is not the only one which must look to the future and particularly to the end of the war, it is still an important point and must not be disregarded.

Kenneth Spees spoke for Mr. C. M. Everts, State Sanitary Engineer of Oregon, who had just been called into the army. Mr. Spees' topic was "The Sinking Funds for Post War Construction in Oregon Cities," and commented on the diversity of methods of charging for sewage works improvements, which will be deferred now until the end of the war. It was evident from his remarks that the State Sanitary Authority of Oregon intends to carry out the mandates of the law by relieving Oregon streams of their pollutional loads. For this reason these sinking funds will create backlogs at the end of the war.

New Officers

The following officers were elected:

President—R. E. Koon, Portland.

First Vice Pres.—Max Campbell, Seattle.

Second Vice-Pres.—C. V. Signor, Grants Pass.

Board of Control—For two years, C. D. Forsbeck, Tacoma; for one year, H. J. Smith, Moscow.

Secretary-Treasurer — Fred Merryfield, Corvallis.

Sewage Works Federation's Third Annual Convention Shaping Up

Place Is Cleveland—New Dates Chosen

THE Federation of Sewage Works Associations, in conjunction with the Ohio Conference on Sewage Treatment, will stage its Third Annual Convention at the Hotel Statler, Cleveland, on October 22-24, 1942, representing a change in dates from October 15-17, inclusive.

This national sewage meeting of the recently reorganized Federation will bring together the leading sanitary engineers, plant operators, educators, manufacturers' representatives and public officials from all sections of the country. The meeting dates now announced as a week later than originally planned and have the advantage of permitting members to attend the A. P. W. A. meeting, which immediately precedes the Federation meeting in the same city, and to go to the A. P. H. A. meeting at St. Louis, which immediately follows the sewage sessions. This dovetailing of meetings is in keeping with war economy measures.

In view of the effect of war on sewage flows, sewage composition, industrial wastes and other aspects of sewage treatment, the convention will be devoted primarily to a timely technical evaluation of these pressing national wartime problems. The country's leading authorities will discuss sewage works, student training, state health control, army camp sanitation and industrial waste problems which have developed as a result of war conditions. Progress of sewage works construction during war times and the question of priorities and conservation of materials will be featured in the discussions. Plant operators will present their experiences in a symposium on plant maintenance in war times which will cover mechanical units, electrical equipment, sewers, structures, personnel, and sabotage protection.

In this period of stress, sanitation plays such an important role that it is expected that the attendance will be swelled by those who deem it essential to attend a war conference at this time. The meeting should be a "must" for every active worker in this field.

Preparations for the convention are already going forward under the guidance of committees chosen from all sections of the country. The personnel of the Convention Management Committees follows:

William L. Havens, Chairman.

John J. Wirts, Vice Chairman.

F. P. Fischer (Local Finance).

Clinton Inglee (Entertainment).

W. J. Orchard (Financial Adviser).

A. H. Niles.

Arthur S. Bedell,[1] ex-officio.

Arthur T. Clark,[2] ex-officio (exhibits).

Charles A. Emerson,[3] ex-officio.

W. H. Wisely,[4] ex-officio.

(1) Federation President.
(2) In Charge of Exhibits.
(3) Past-President of the Federation.
(4) Exec. Secy. of the Federation.

SEWERAGE BETTERMENTS OF ENGLEWOOD, N. J.

By HENRY H. STEPHENS
FAIRBANKS, MORSE & CO.
New York, N. Y.

FOR fifty-three years the sewerage system now serving the 19,000 inhabitants of the City of Englewood, N. J., was privately owned and operated.

In October, 1941, the city celebrated the first twelve months of municipal ownership, and even after the first year of municipal operation several benefits and advantages of public ownership have been made decidedly apparent. Amongst these advantages is the fact that today the users of this system are enjoying a flat 10 per cent reduction in sewerage service charges, and a long needed engineering improvement is being paid for out of sewerage revenue. What's more, a surplus is being built up, such being the result of the fact that when the sewer bonds were sold, Englewood's credit in the market commanded the unprecedented low interest rate of 1.98 per cent, one of the lowest rates on record in the municipal bond market.

The great success achieved by Englewood in the matter of sewerage finances under municipal ownership led to the replacement of all obsolete equipment in the system with a new and efficient pumping station capable of caring for the needs of a progressive municipality.

The New Englewood plant went into operation on November 25, 1941, and has been loudly praised in both engineering and municipal circles.

Pumping Facilities

The pumping equipment supplied by Fairbanks-Morse comprises three units. Two are 4-inch F-M Fig. 5412 vertical sewage pumps for capacities of 500 and 700 GPM, and the third unit is a 5-inch Fairbanks-Morse Fig. 5413 vertical sewage pump for a capacity of 1,200 GPM. These are capable of passing 3-inch spheres and the motors are set at floor level about 20 feet above the base of the pump (see cut). The floor is at least 18 inches above the highest recorded tide level in the area. Three F-M motors of 5, 7½ and 15 HP. are connected to the pumps with Watson-Spicer flexible type shafting, with two intermediate bearings (see cuts). Each bearing is provided with a strong structural steel support.

G. Russell Hartley, City Engineer, Englewood, N. J.

In the foreground is seen one of the Watson-Spicer flexible pump drive shafts which eliminate "whip" and dissipates vibration.

Auxiliary Drive

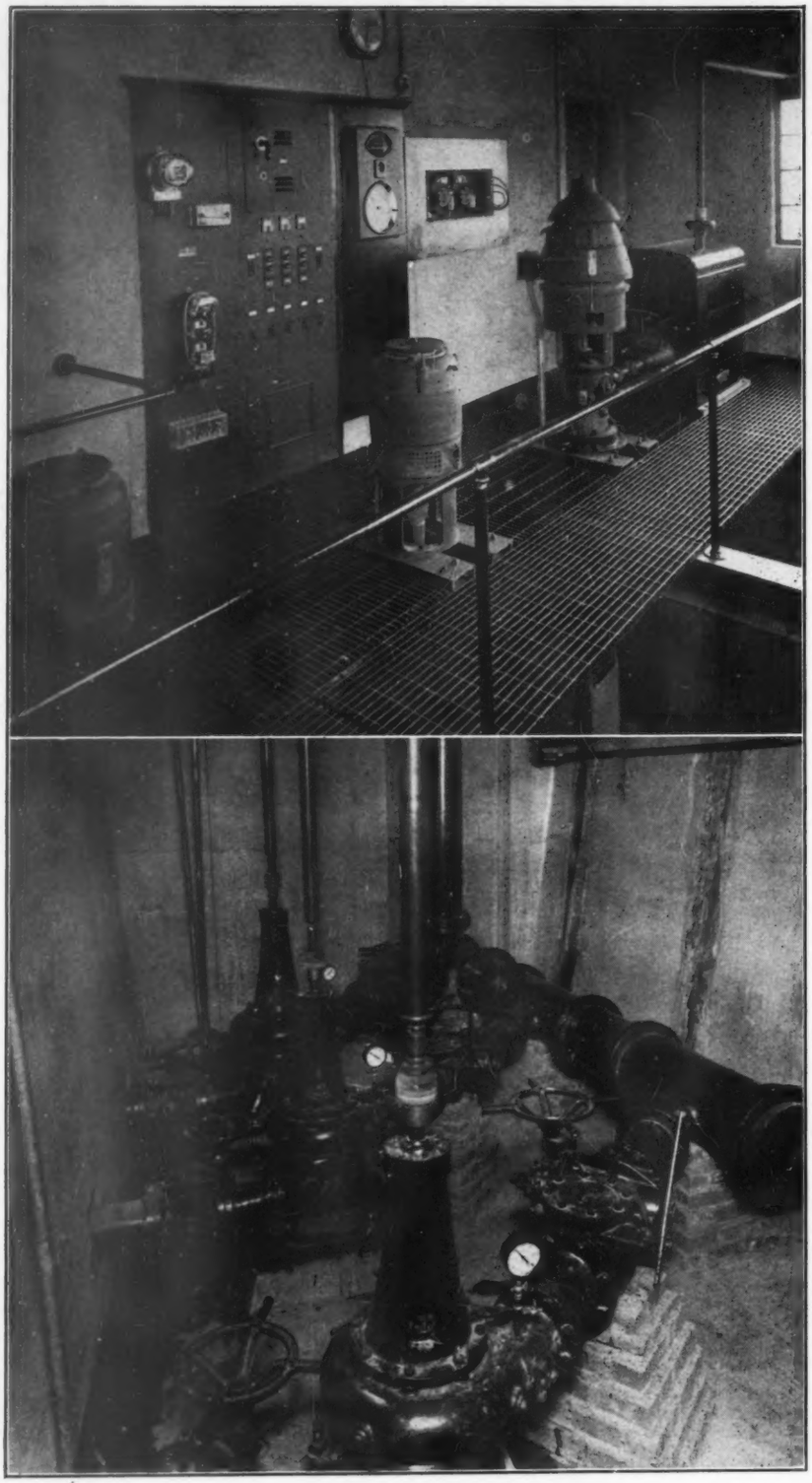
Alert to emergency needs and possible power failure, G. Russell Hartley, City Engineer of Englewood, has provided for an auxiliary drive by means of a Fairbanks-Morse FM-½ vertical right angle gear and a Fairbanks-Morse No. 65 3¼x4⅛ inch, 6-cylinder industrial power unit on the 1,200 GPM. pump. The engine is capable of running the pump at a greater speed than the electric motor.

The pump casing and shafting will permit a change of impeller and motor so that the capacity of any pump may be changed to meet circumstances in the future. There is also an additional suction pipe installed to the wet well to permit the installation of a fourth pump when needed. The large pump has an auxiliary suction provided to drain the pump room in case of necessity. In addition there is a 1-HP. Fairbanks-Morse automatic electric sump pump for the pump room.

The New Plant

The sewage enters the station through a transition section from a 24-inch reinforced concrete trunk sewer and is screened by a 48-inch wide "Tritor" screen, manufactured by the Link Belt Co. This screen, with 1-inch spacing of bars, is equipped with baffles, weir and 48-inch deep sump in which the grit settles out of the sewage. The screen bars and their bucket cleaning device are set at about a 60 degree angle and the conveyor is built to discharge screenings on a chute above the main pump room floor. From this location it is removed by buggies and buried on the property. The entire screening operation is housed in one corner of the pumping station building, completely separated, however, from the other equipment by partition walls and a steel door.

The wet well is truncated prism with two sides sloping 45 degrees to the narrow bottom so solids cannot accumulate in any corner. The pump



(Above) Motor and Control Balcony
On the right is the auxiliary FM. Power Unit with right-angle gear connected through a clutch.

(Below) F.-M. Pumps and Nordstrom Plug Valves
Of 500, 700 and 1,250 G.P.M. capacity respectively, the largest being connected to the FM. Power Unit.

suctions are spaced along the nearly vertical sides at equal intervals. All concrete that may become wet by sewage is coated with Wailes, Dove and Hermiston No. 50 Bitumastic enamel, including the sewer entering the plant.

The cast iron pipe in the building is all United States Pipe & Foundry Co. flanged pipe and specials. The discharge line to the old plant is bell and spigot pipe of the Super De Lavud type. Each pump has a Nordstrom valve of the plug type on each side. These valves, equipped with worm gears, may be operated from a higher level. There is also a Crane Check Valve on the discharge side of each pump. All valves and header pipes are set in a horizontal position.

Pump Control

The electrical control of the pumps is arranged on a panel board set in the wall parallel to the pumps and is over wet well wall. A master switch of the air circuit-breaker type is on top of the panel board. Each pump motor has its individual air circuit-breaker, stop and start button for hand control, also for automatic control. A chart record is made of pump operation. The screen has a circuit-breaker in its panel, but it is further controlled by switch and push buttons alongside the screen room. There are two spare circuits for additional equipment and the Trumble circuit-breaker lighting panel on the board.

Pump operation is actuated by a pressure device, operated from the wet well. This device is called the "Rototrol" Sump Control and is manufactured by the Water Levels Control Co. It is arranged for five sequences of operation with water level rising and an equal number with water level falling.

Metering

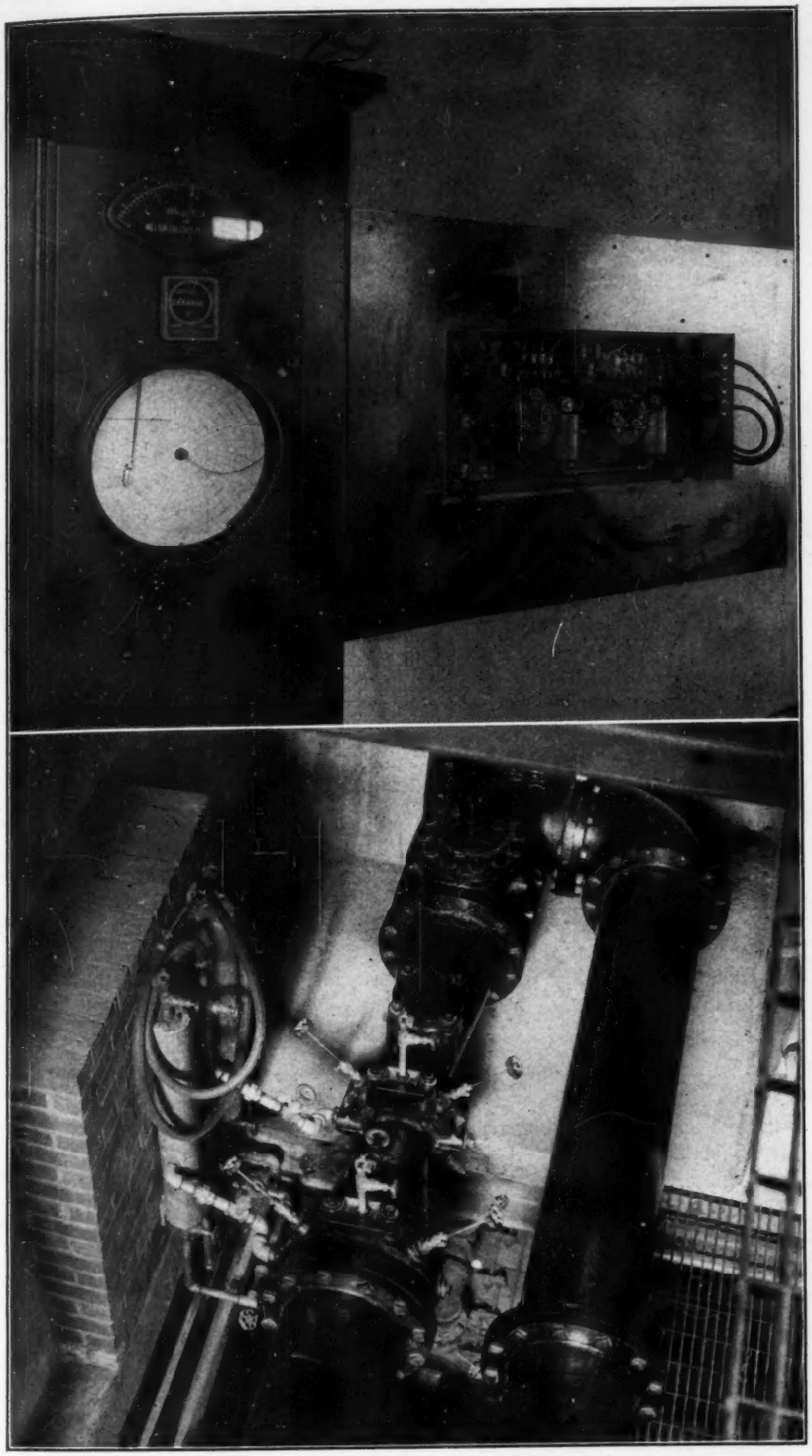
The flow is measured and recorded by a Simplex Venturi tube connected to the recording unit on the operating floor. The tube proper is in the pump discharge line and is provided with a by-pass and valve arrangement so that it may be taken out of service if necessary for any reason without stopping operation of the pumping station. The Simplex indicating and recording unit is set in the wall alongside of the electric control panel and the Rototrol sump control.

The indicator shows the rate of pumping in gallons per minute and per day, and the recording mech-

anism shows the total number of gallons pumped. The chart provides a record of pump operations and rates of flow.

Exterior work on the new station is still under way, being conducted by the W. P. A., with Englewood maintaining a number of men on the project. These have taken over the responsibility for keeping the excavation dry and for placing reinforcing steel and other work needed in putting a foundation 16 feet below mean sea level in a tidal swamp.

The highly efficient engineers' office in Englewood, which has received merited praise, is under the direction of Mr. G. Russell Hartley, City Engineer, who designed and supervised the erection of the new station. In addition to engineering and design, the City Engineer is in charge of all public works.



(Above) Simplex Indicating, Totalizing and Recording Unit. Next to the "Rototrol" Pump Control

The control is arranged to provide five sequences of capacity pumping operations on a rising well and five sequences on a falling well.

(Below) Simplex Venturi Tube and Bypass

Prizes Doubled in Compressed Air Inst. Contest

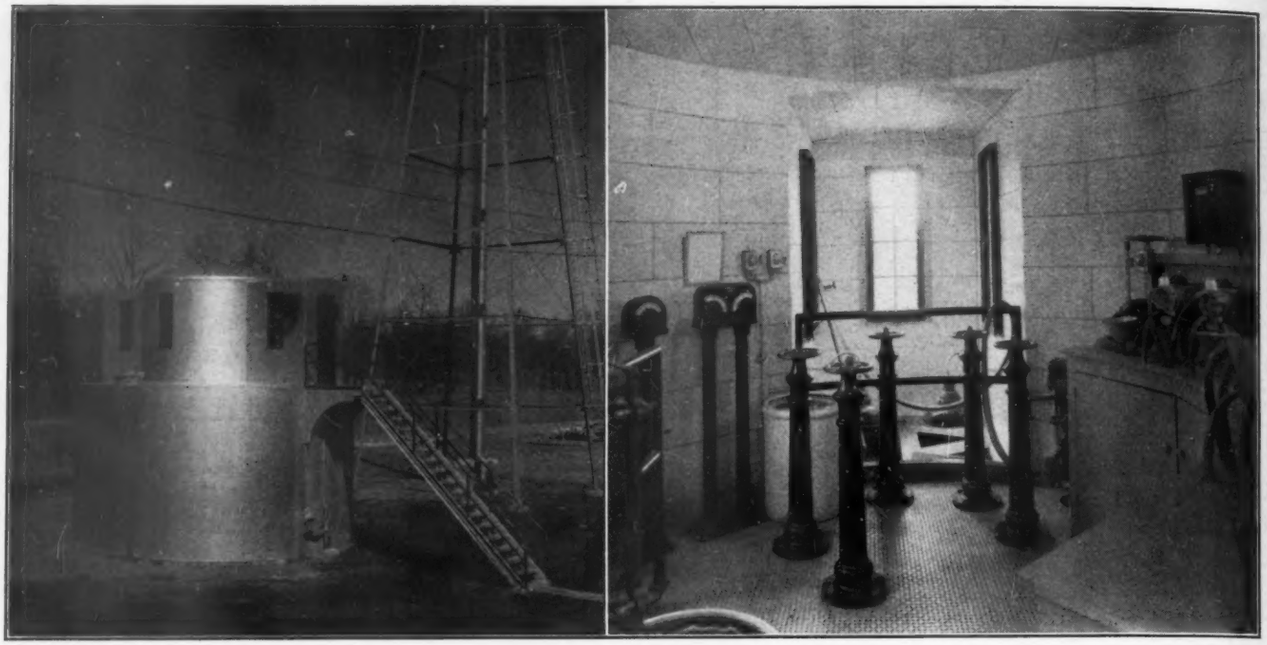
In our November, 1941, issue on page 535 was announced the prize contest being conducted by the Compressed Air Institute, a trade association supported by the leading manufacturers of air compressors and various equipment operated on compressed air.

To enter the contest it is only necessary to prepare a brief paper telling of some novel application of compressed air, or some economic advantage from the use of compressed air.

The Institute now announces that the closing date for the contest has been extended a month to July 2, 1942—and that the cash prizes offered have been doubled. To win a $50.00 prize it is only necessary that the manuscript entered be found worthy of printing in the appropriate trade journal. The total in prizes to be won is now doubled to $1,000. The grand prize is $200 and three others are $100 each. Any number of $50 prizes are offered.

Anyone who has put compressed air to some unusual or novel use should write it up (even a letter will serve) and submit it to the Compressed Air Institute (C. C. Rohrbach, secretary), 90 West St., New York. (If WATER WORKS AND SEWERAGE can be of some assistance in editing and entering papers we shall be pleased to do so, with the understanding that such papers may later be reproduced in this magazine.—L. E.)

Truly a "Watch Fob" Filter Plant



The Smallest Morse Filter Plant Ever Built

We are indebted to the Chicago Bridge and Iron Co. for supplying the accompanying pictures of exterior and interior of this miniature Morse type filter plant. Since it was installed in a war production plant its location cannot be revealed.

To look at it, one would think the plant to be about the size to use in the field for an army corps. However, its watch-fob appearance is deceiving, for it has a capacity of almost 50,000 gals. per day, and if stepped up to 3 gals./min./sq. ft. of filter area, will turn out almost 65,000 gals. per day.

The mixing chamber provides a 30 minute mix and the clarification tank a 6 hour period. The central clear well holds 4,500 gals. The filter area is 15 sq. ft. and the sand bed is 30 in. deep on 18 in. of graded gravel.

Infilco, Inc., of Chicago supplied the rate controller and the Rate of Flow and Loss of Head Gauges showing in the picture. The twin centrifugal pumps (40 g.p.m. capacity each) are Ingersoll-Rand's, and Golden Anderson Valve Co. of Pittsburgh supplied Pressure Reducing Valves, while all other valves are Ludlow's. The solution chemical feeders, supplied by Proportioneers of Providence, start and stop automatically and are duplex type units feeding alum, soda ash and hypochlorite. Cast-iron pipe and fittings come from ACIPCO at Birmingham.

The important units in the plant are electrically operated to provide float controlled automatic start-and-stop operation without the presence of an attendant.

We Are Sorry!

Our attention has been directed to a statement made in the article describing the new Toledo Filter Plant by F. R. Hawkins in our April issue to the effect that Mills, Rhinis, Bellman and Nordhoff, Inc., of Toledo served as consulting engineers with Greeley and Hansen of Chicago on the design of the plant.

Fact is, Greeley and Hansen were the designers and supervising consultants on the project and Mills, Rhinis, Bellman and Nordhoff served as consulting architects to the consulting engineers, Greeley and Hansen, in whose offices the architectural plans were prepared in consultation with the Toledo architects.

Detailed supervising work on construction was handled by the city under Wm. G. Clark, as Engineer in Charge of Construction. City Manager George N. Schoonmaker reviewed the plans and specifications and participated in their making. Robert W. Furman, Commissioner of Water and long Sup't. of Purification, supplied helpful advice on all matters pertaining to filtration and plant operation.

St. Louis County Water Co. Changes Hands

Purchased by C. S. Mott Who Also Acquired the Northern Illinois Water Corpn. Recently

The St. Louis County Water Co. has been purchased by Chas. S. Mott of Flint, Mich., a one time axle maker who became a motor magnate. It was bought from the Commonwealth Utility Corpn. of Philadelphia at a reported price of $3,260,000 for the 22,000 shares of common stock.

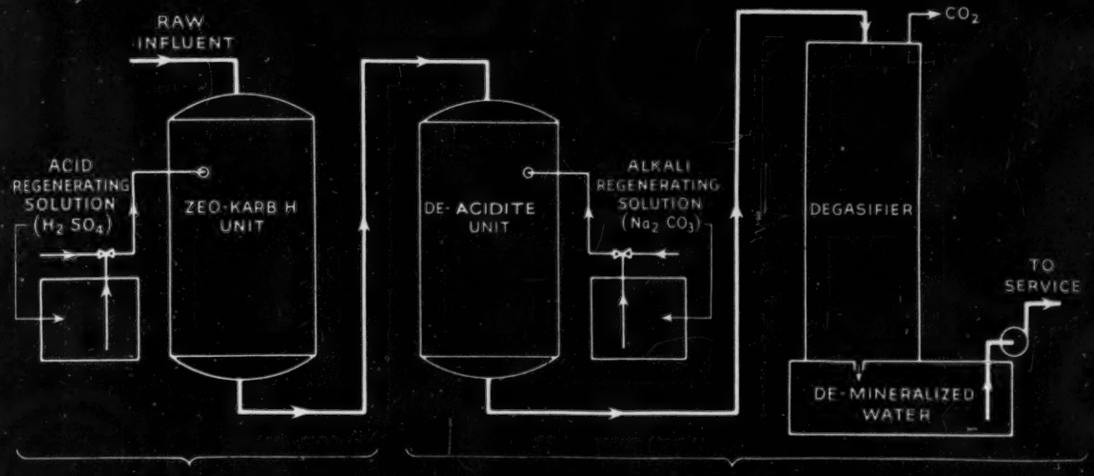
The purchase was made through John G. Getz, Jr., of Detroit, president of the Northern Illinois Water Corpn., which was only recently purchased by Mr. Mott, reputed to have amassed the tidy sum of $150,000,000 in the motor car field. A retired vice president of General Motors, he is still a director and said to have been the largest individual owner of GMC stock.

The largest property of the Northern Illinois Water Corpn. is the Champaign-Urbana Illinois Water Service Co.

Of the Champaign property, Frank C. Ambary, Jr., is superintendent. Of the St. Louis County system Victor Weir is superintendent. So Mr. Mott purchased a lot of high grade management along with the two plants.

In commenting on the purchase, Mr. Mott stated that he expects to keep the property which his engineers reported to be of the foremost operating utility companies in the country.

NEW PERMUTIT* PROCESS FOR DE-MINERALIZING WATER



STEP NO. 1
REPLACEMENT OF METALLIC CATIONS BY HYDROGEN (H ION) CONVERTS SALTS PRESENT IN RAW WATER INTO CORRESPONDING ACIDS, VIZ. HCL, H_2SO_4, H_2CO_3

STEP NO. 2
REMOVAL OF ACIDS FORMED IN STEP NO. 1. THE HCL AND H_2SO_4 ARE ABSORBED IN THE DE-ACIDITE UNIT AND THE H_2CO_3 DECOMPOSES INTO H_2O AND CO_2, THIS CO_2 ESCAPING TO THE ATMOSPHERE IN THE DEGASIFIER.

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Los Angeles San Francisco

MEETINGS SCHEDULED

May 21—MANCHESTER, N. H. (Manchester Country Club)
New England Water Works Association. Secretary, F. J. Gifford, 613 Statler Building, Boston, Mass.

May 22—PENNSAUKEN TWP., N. J. (Kugler's Mohican Club)
South Jersey Ass'n of Water Superintendents. (4:00 P. M. Dinner 6:00 P. M.) Secretary, Walter Spencer, 2707 Bethel Ave., Merchantville, N. J.

May 27-28—BOSTON, MASS. (Hotel Bradford)
New England Sewage Works Association. (Spring Meeting.) Sec'y-Treas., LeRoy W. VanKleeck, State Dept. Health, Hartford, Conn.

May 27-30—GAINESVILLE, FLA. (University of Florida Campus)
Short Course in Water and Sewage Treatment. (10th Annual Meeting.) Dr. A. P. Black, Professor of Chemistry, Univ. of Florida, Gainesville.

June 4—NEW CASTLE, PA. (Hotel Castleton)
Western Pennsylvania Water Works Operators' Assn. Sec'y-Treas., I. M. Glace, 22 South 22nd St., Harrisburg, Pa.

June 5-6—ALBANY, NEW YORK (Hotel Ten Eyck)
New York State Sewage Works Association. (Spring meeting.) Sec'y-Treas., A. S. Bedell, State Dep't of Health, Albany, N. Y.

June 8-11—CLEVELAND, OHIO (Hotel Statler)
American Society Mechanical Engineers. (Semi-Annual Meeting.) Secretary, C. E. Davies, 29 West 39th St., New York, N. Y. (Fall Meeting, Oct. 12-14, Sagamore Hotel, Rochester, N. Y.)

June 10—ORONO, MAINE (University of Maine)
Maine Water Utilities Association. (Bi-Monthly Meeting.) Secretary, Earle A. Tarr, Winthrop, Me.
(Next meeting Aug. 12—Camden, Maine.)

June 18-19—MINNEAPOLIS, MINN. (Nicollet Hotel)
Central States Sewage Works Association. (15th Annual Convention.) Sec'y-Treas., E. J. Beatty, 458 State Office Bldg., Madison, Wis.

(Note the change in schedule of this meeting from October in the past to June henceforth. This year the dates were purposely chosen to immediately precede the A.W.W.A. Convention, which is to be held in Chicago, June 21-25, with a day for fishing in between.)

June 21-25—CHICAGO, ILL. (Stevens Hotel)
American Water Works Association. (Conference on Wartime Water Works Problems.) Executive-Secretary, Harry E. Jordan, 22 East 40th St., New York, N. Y.

WITH AN AERO-FILTER YOU CAN GET THE RIGHT QUALITY EFFLUENT AT LOWEST COST!

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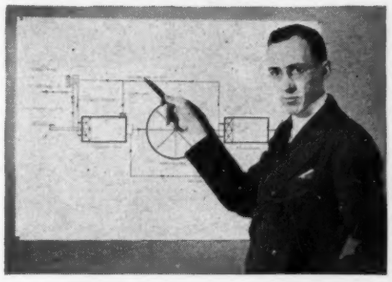

① AERO-FILTER is smaller—requiring from 1/7 to 1/9 the volume of conventional filters. This is possible because of Aero-filter's efficient distribution of sewage on the filter beds. You get MAXIMUM EFFICIENCY from a minimum filter bed volume.

② SECONDLY, single or two-stage Aero-filters, with supplementary units, provide a choice of design possibilities. Practically any degree of purification may be obtained—AT MINIMUM COST.

③ EXPERIMENTING unnecessary! Aero-filter's performance is proved in both northern and southern climates—accepted by State Boards of Health. Yes, its superiority is a well-established fact among men who know!

④ HERE'S the whole story in catalog No. 329! Read it over and see if you, too, don't think that Aero-filter answers the demand for QUALITY at LOW COST. May we prove this to you for your plant.

Ask us for your Aero-filter catalog and other catalogs of REX Sanitation equipment which interest you: Bar Screens, Triturators, Grit Collectors and Washers, Chain & Scraper and Tow-Bro Sludge Collectors, Rapid Mixers, Slo-mixers, etc. Address: Chain Belt Co., 1610 W. Bruce, Street, Milwaukee, Wisconsin.

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MEETINGS SCHEDULED

Aug. 25-28—HOUSTON, TEXAS
American Society Sanitary Engineers. Secretary, J. W. Walker, City Hall, Waterbury, Conn.

Aug. 25-26—HARRISBURG, PA. (Penn-Harris Hotel)
Pennsylvania Sewage Works Operators' Ass'n. (Annual Meeting.) Sec'y, Bernard S. Bush, State Dept. Health, Harrisburg, Pa.

Aug. 27—HARRISBURG, PA. (Penn-Harris Hotel)
Pennsylvania Water Works Operators' Ass'n. (Annual Meeting.) Sec'y, I. M. Glace, 22 South 22nd St., Harrisburg, Pa.

Sept. 9-11—TRAVERSE CITY, MICH. (Park Place Hotel)
Michigan Section, A.W.W.A. Sec'y, M. N. Gerardy, Sup't Water Supply, Water Board Bldg., Detroit, Mich.

(Meeting jointly with)

Michigan Conference on Water Purification. Sec'y, R. J. Faust, Dep't of Health, Lansing, Mich.

Sept. 15-18—POLAND SPRING, ME. (Poland Spring House)
New England Water Works Association. Sec'y, Frank J. Gifford, 613 Statler Bldg., Boston, Mass.

Sept. 17-18—CHEYENNE, WYOMING (Frontier Hotel)
Rocky Mountain Section A.W.W.A. Secretary, B. V. Howe, 201 Argonaut Hotel, Denver, Colo.

Sept. 18—PITTSBURGH, PA. (Roosevelt Hotel)
Western Pennsylvania Section A.W.W.A. Secretary, E. P. Johnson, 418 Flannery Bldg., Sta. 13, Pittsburgh, Pa.

Sept. 24-26—ST. PAUL, MINN. (Lowry Hotel)
Minnesota Section A.W.W.A. Secretary, A. M. Finch, Wallace & Tiernan, Inc., 416 Flour Exchange, Minneapolis, Minn.

Sept. 25—NEW LONDON, CONN. (Ocean Beach Pavilion)
New England Sewage Works Association. (Fall Meeting.) Sec'y-Treas., LeRoy W. VanKleeck, State. Dept. of Health, Hartford, Conn.

MEETINGS SCHEDULED

Oct. 7-9—PHILADELPHIA, PA. (Benjamin Franklin Hotel)
Four States Section A.W.W.A. Secretary, H. Lloyd Nelson, 1624 Lincoln-Liberty Bldg., Philadelphia, Pa.

Oct. 12-15—LITTLE ROCK, ARK.
Southwestern Section A.W.W.A. Secretary, Lewis A. Quigley, City Water Works, 3320 W. Berry, Fort Worth, Texas.

Oct. 15-17—CLEVELAND, OHIO (Hotel Statler)
Ohio Conference on Sewage Treatment. (Meeting with Federation of Sewage Works Associations). Sec'y-Treas., W. D. Sheets, 568 E. Broad Street, Columbus, Ohio.

Oct. 18-21—CLEVELAND, OHIO (Statler Hotel)
American Public Works Association. (Annual Public Works Congress.) Exec. Dir., Norman Hebden, 1313 East 60th St., Chicago, Ill.

Oct. 19-21—PADUCAH, KY. (Irving Cobb Hotel)
Kentucky-Tennessee Section A.W.W.A. Secretary, H. D. Schmidt, Div. San. Eng., State Dept. of Health, Nashville, Tenn.

Oct. 22-24—ST. LOUIS, MO. (Coronado Hotel)
Missouri Valley Section, A.W.W.A. Sec'y, Earle L. Waterman, 104 Engineering Hall, University of Iowa, Iowa City, Ia.

Oct. 22-24—CLEVELAND, OHIO (Hotel Statler)
Federation Sewage Works Associations. (3rd Annual Convention.) Sec'y, H. W. Wisely, Urbana-Champaign Sanitary District, Urbana, Ill.

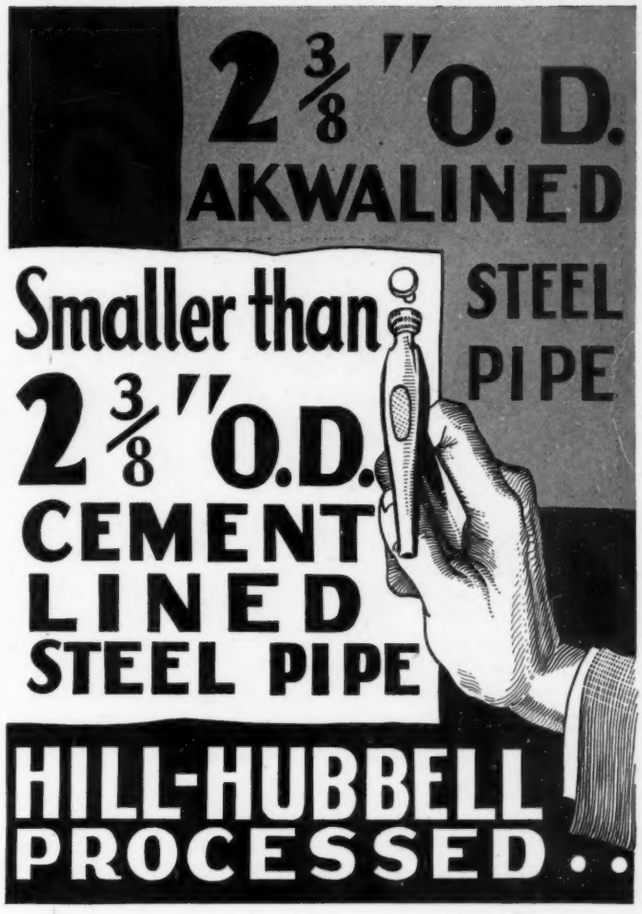
Oct. 27-30—ST. LOUIS, MO. (Jefferson & Statler Hotels)
American Public Health Association. Exec.-Sec'y, Dr. Reginald M. Atwater, 50 West 50th St., New York, N. Y.

Oct. 28-30—OAKLAND, CALIF. (Hotel Oakland)
California Section, A.W.W.A. Sec'y, H. Arthur Price, Dept. Water and Power, 316 West 2nd St., Los Angeles, Calif.

Nov. 2-4—DURHAM, N. C. (Washington Duke Hotel)
North Carolina Section, A.W.W.A. Sec'y, R. S. Phillips, Chief Chemist, Water Department, 206 Dacian Ave., Durham, N. C.

(Meeting jointly with)

North Carolina Sewage Works Ass'n. (22nd Annual Meeting). Sec'y-Treas., R. S. Phillips, 206 Dacian Ave., Durham, N. C.



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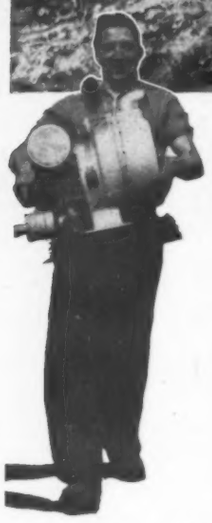


HOMELITE Self-Priming Pumps Handle Seepage Automatically

A Homelite Portable Pump has a capacity of 15,000 gallons per hour—but that doesn't mean it's too proud to handle the small stuff. Far from it. A Homelite is just as efficient with seepage, no matter how small, as it is with large volumes. Being completely self-priming, it keeps seepage always at strainer level. It prevents water from accumulating. Insures drier and better footings for your men.

Easily portable, only 91 pounds complete with its built-in engine, a Homelite is the ideal pump for hard general duty. It has a 28 foot suction lift. It is non-clogging. And it's built for rugged service.

A Little Care Means Extra Wear

Homelite users can get better and longer service out of their pumps with just a little care.

1. Keep the suction hose tight and leak proof.
2. Always use a strainer on the suction hose.
3. Always mix ¾ pint of No. 40 oil with each gallon of gasoline used.
4. Keep breaker points set at .020 inches.

Send for our helpful service manual. Specify model and serial number of the Homelite Pumps you are now using.

HOMELITE CORPORATION

2505 RIVERDALE AVE., PORT CHESTER., N. Y.

LITERATURE AND CATALOGS

"Water Meter Testing — Why, When and How" is the 1942 edition of Ford's "handbook" on meter testing, the popular first edition of which was published by Ford Meter Box Co. in 1936. To the 1942 edition has been added the important WHEN (how frequently) to the WHY and HOW meters should be tested. In the preparation of the 1942 handbook Ford has drawn from authoritative material on meter testing from leading waterworks, operators, which is to be found only by a search of numerous publications.

The important WHEN to test represents a condensation of D. R. Taylor's articles *"On Watching Your Cash Register"* which ran in September, October and November, 1939 issues of "Waterworks and Sewerage." Since Ford has given considerable space to Mr. Taylor's contributions it is tantamount to saying that these represent the best that has ever been published on this dollar and cents aspect of a properly derived schedule of testing low return and high return meters. *"The Importance of Testing Meters at Correct Rates of Flow"* is a noteworthy contribution of P. S. Wilson, also from "Water Works and Sewerage." Next follows a discussion of *"The Principles of Water Meter Testing"* and *"The Importance of Maintaining Meter Sensitivity"* is a discussion by Samuel F. Newkirk, chairman of the A.W.W.A. Committee on Metering and Meter Specifications. A chapter is devoted to *"Testing Large Water Meters,"* with especial reference to the methods developed in the St. Louis Water Department by Robert M. Bell—(W.W.&S., July, 1941.).

A very useful and complete listing of leading articles pertaining to water meter testing and maintenance within the past 6 years appears in the rear of the handbook. And, an interesting tabulation of regulations in nine states, covering accuracy requirements and required frequency of testing, reveals a noticeable lack of uniformity.

In an unobtrusive manner the bottom of each page of the handbook is devoted to a brief description and picture of the numerous units of Ford Meter Setting Equipment and elsewhere typical Ford Tester installations and other Ford testing equipment are pictured.

Everyone interested in meter test

procedure would do well to request a copy of "Water Meter Testing—Why, When and How" from the Ford Meter Box Co., Wabash, Indiana.

"Algae-Control—Another Experience With The Carbon Blackout Method" is related in an article appearing in the *Taste and Odor Control Journal* published monthly by the producers of NUCHAR activated carbon. The successful experience with the scheme of carbonizing the top water in reservoirs or clarification in basins, to prevent penetration of actinic light on bright sunshiny days, is told by Messrs. Hartung (chemist) and Lischer (production engineer) of the St. Louis County Water Co. To the 30 m.g. basins, with surface area of 380,000 sq. ft., the carbon is applied on bright days only and the batch of 100 pounds (0.26 lbs. per 1,000 sq. ft.) is dosed in the early morning only. The simple scheme involves the use of an ordinary ¾" water jet-air eductor. The 10 ft. suction hose placed in a carton of dry carbon sucks out at the rate of 100 lbs. of the black dust in 43 minutes. The outfit being readily moved is convected at various points to a pressure supply line installed around the four sides of the basins. The effectiveness of the method was unmistakable, and the economy was attributed to the fact that the blanketing scheme, applied once daily, required only 5 lbs./m.g. when figured on the daily output of the plant. The important relationship, however, is the dosage on the surface area basis—0.26 lbs. per 1,000 sq. ft. being ample at St. Louis for creating the light excluding top-water carbon blanket. Any reader not already receiving the *"Taste and Odor Control Journal"* (free circulation) should by all means request as much of the Industrial Chemical Sales Div., West Va., Pulp and Paper Co., 230 Park Ave., New York City.

"The Pittsburgh-National Water Journal," the new bi-monthly house organ of the Pittsburgh Equitable Meter Co. is the re-birth of the old "Water Works Journal," first published in 1908. The first issue of the new publication (March-April) contains several articles of keen interest to water works and sewage plant engineers and operators.

Harry U. Fuller, chief engineer of the Portland (Me.) Water District, tells the story of what is being done to protect England's water works and sewerage systems and the degree of success their precautions and repair methods have had.

Change Sludge into "Folding Money"!

Many Cities Are Doing It with a Royer!

It sounds like magic, but it is the plain truth! Sewage treatment plant engineers all over the United States bear this out. They say the Royer Sludge Disintegrator saves them time and money from the moment it goes on the job; and, by preparing sewage sludge for marketing as a fertilizer, it taps a continuous flow of revenue.

A Royer NSD-P owned by the Charlotte, North Carolina, sewage plant is shown here performing two essential operations simultaneously—shredding the thick sludge cake into pea-sized particles and loading it onto a truck for delivery where desired.

Notice that the sludge fertilizer is thoroughly clean when it passes through the Royer for sticks, stones and trash are completely removed. The sludge comes out ready for top dressing or fertilizer, or as a base for a high strength fertilizer. Enriching chemicals, when indicated, are thoroughly mixed with the sludge by the Royer.

Find out today how you, too, can make a generous profit from sludge. A Royer saves you the expensive operations of burying or burning, and translates sludge into cash by sales to parks, schools, golf courses, nurseries, florists, cemeteries, private homes, truck farms and others interested in greater soil fertility.

No matter what the size of your plant, there is a Royer exactly suited to your needs. Merely in the saving of time and labor at the plant makes it a wonderful buy. Many plant superintendents declare, "It's the most valuable piece of equipment we own."

THE ROYER

ROYER FOUNDRY & MACHINE CO.
170 PRINGLE ST., KINGSTON, PA.

His findings are based on discussions with English friends and an extensive study of the literature. This thorough and forceful article tells exactly what problems American engineers and superintendents will be called upon to solve. Co-operation between utility systems is shown to be the key to efficiency in repairing broken mains, treating polluted water and maintaining pressure for fire service. Not only should there be alternative and interconnecting water supplies, where practical, but there should be mutual assistance in the use of equipment, mobile sterilization plants, and repair crews. This article is a timely guide.

Pittsburgh's colorful new house organ contains several other interesting articles and is profusely illustrated with photographs of equipment and plants. A copy of the March-April issue of "The Pittsburgh-National Water Journal" (and those to follow) can be had gratis by writing the Pittsburgh Equitable Meter Co., 400 North Lexington Ave., Pittsburgh, Pa.

"The Flow Line" is a brand new house organ, published jointly by the Merco Nordstrom Valve Co. and Pittsburgh Equitable Meter Co. The first issue (March-April) has recently been received. It is an attractively illustrated 18-page magazine carrying the sub-title "a magazine of measurement and control."

The story of the construction and operation of the Colorado Aqueduct in California, in relation to its use of various sizes of Nordstrom valves, is told in one of the longer articles. Another interesting story, also from California, concerns the operations of the American Potash and Chemical Co. plant located at Trona, California, in the Mojave Desert, on the edge of an unusual chemical deposit known as Searles Lake. The surface of the lake is a compact, level mass of salt crystals, but below this the crystalline structure is cellular and contains a large quantity of dense brine. The brine is pumped from the crystalline mass and piped four miles to the plant, where it is processed into such products as borax, soda ash, bromine and lithium salts. Photographs show some of the large Nordstrom valves used in the processing.

Also included in the first issue of "The Flow Line" is an article on pressure regulation by A. D. MacLean and a news item on the dedication of the 456-mile gasoline pipe line at Chattahoochee, Georgia. Besides the extremely interesting articles, the magazine contains a varied collection of news items, human interest anecdotes, jokes, and "brain-teezers." To get on the free-circulation mailing list a postal card is sufficient to "The Flow Line," 400 Lexington Avenue, Pittsburgh, Pa.

Wilson "Pulsafeeders" are being offered as positive and dependable units for emergency chlorination of water. Construction features of this equipment, currently being used for the control of a large variety of liquid chemicals, are described and illustrated in Bulletin BLW-25 recently received from Wilson Chemical Feeders Inc. An accompanying bulletin (No. 1-1192) describes the dual-drive, heavy duty type DEG, especially recommended for emergency sterilization of water supply. This new and highly flexible portable feeder is described and pictured on page 77 of W.W.&S. for March, 1942.

"Pulsafeeders" were developed by Wilson several years ago, and their success is partially attributable to the elimination of packing glands and mechanically oscillated

Portsmouth, Va., with a heavy influx of Navy Yard workers, increased its water supply from 6,000,000 to 13,000,000 gallons per day by building a 13-mile water line of 30-in. concrete pipe. Laying crew placed 400 ft. of pipe daily.

Defense-area water and sewerage projects need the durability and economy of

CONCRETE PIPE

Concrete pipe has proved its durability on a vast scale, with installations dating back half a century and more. While conserving critical materials, it fully meets ALL the requirements of moderate first cost, structural safety, minimum infiltration and leakage, and maximum hydraulic capacity.

Technical assistance is available to engineers and builders engaged in vital wartime projects involving concrete pipe or other concrete construction.

PORTLAND CEMENT ASSOCIATION
Dept. 5-29, 33 W. Grand Ave., Chicago, Ill.

A national organization to improve and extend the uses of concrete . . . through scientific research and engineering field work

BUY DEFENSE STAMPS AND BONDS . . . SUPPORT THE RED CROSS

diaphragms. Two types of re-agent heads are available; Type "A" head, constructed of plastics and synthetic products; and Type "S" head, fitted with metal or metal-alloy "pulsaphragm." The design of these re-agent heads is shown on two cross section drawings accompanying Bulletin BW-25.

Several types of "Pulsafeeders" are shown, a notation under each telling the number of the technical bulletin which covers its design and uses more fully. For a copy of Bulletin BLW-25 and additional information write to Wilson Chemical Feeders, Inc., Buffalo, N. Y.

Sea-Ro Armoured Nek-Seal Packing, composed of three individual sealing elements, is described in a folder from the Sea-Ro Packing Co. The casing is constructed of layers of anti-friction foil, providing a full metallic surface on the rod or shaft. Within this is a semi-metallic core and the "nek-seal" fillet. The core is a homogeneous mass containing finely shredded alloy, along with graphite material and individual fibres of asbestos. The "nek-seal" fillet, composed of the same material as the casing, runs lengthwise through the pressure corner of the packing and thereby provides reinforcement at the point of greatest stress.

The new packing is applicable for either hot or cold water, steam, gasoline, and some chemicals. Used on centrifugal pumps, it is recommended for surface speeds up to 5,000 feet per minute and for temperatures as high as 500° F. Photographs show the three elements of the packing and their relative positions when installed in a stuffing box. Armoured "nek-seal" packing is furnished in rings moulded to exact size. Instructions for installation are also included in the folder. For a copy write to the Sea-Ro Packing Co., Wood-Ridge, New Jersey.

A New Handbook on Steel Tanks —has been produced by the Buffalo Tank Corporation. In the handy 6x9 inch size, with flexible binding and flat opening construction, there are 288 pages of useful information for all who plan, purchase or maintain steel tanks of any style or type for any use. In addition there are many pages of engineering data of general handbook nature with wide application and usefulness. Section I covers the general considerations in "Steel Plate Construction"—specifications, corrosion and effective paint protection. Section II and III deal specifically with "Storage Tanks" of all varieties, including water tanks, stand-pipes, hydropneumatic and hot water tanks. Section VIII is devoted to "Welding"—types of welding, symbols and definitions, electrolers, joint stresses, etc. Other sections are devoted to "Pipes, Tubes and Stacks"; "Air, Water, Gas, Steam and Heat." The final section embraces 84 pages of "Engineering Tables," conversion factors, and a variety of useful engineering data. This handbook is an expensive production, but we understand that it can be obtained by request on a company or city letterhead, addressed to the Buffalo Tank Corporation, Buffalo, N. Y.

"Trade Standards," issued by the Compressed Air Institute, contains a wealth of technical information that is important to our all-out war effort.

The publication is divided into two parts, the first devoted to general information about compressed air equipment and its uses. After a preliminary definition of terms and a discussion of nomenclature and terminology, the book gives a general description of standards

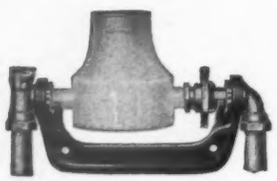
"GRANDPAPPY USED TO HOOK UP TO MATHEWS HYDRANTS"

Once you set Mathews Hydrants, you'll probably never dig them up again. Not only will they last indefinitely—you can see plenty with 50 and 60 years of uninterrupted service—but they can be inspected, repaired or completely modernized without digging. That's because Mathews Hydrants are always built with an outer protection case, through which the entire barrel, containing all working parts, can be unscrewed, lifted out, and repaired or replaced. Investigate this Mathews feature as a time-saver, a frost protection, and a vital air-raid precaution.

MATHEWS HYDRANTS
400 CHESTNUT STREET, PHILADELPHIA, PA.
ESTABLISHED IN 1803
Made by R.D. WOOD Company
MANUFACTURERS OF SAND SPUN PIPE (CENTRIFUGALLY CAST IN SAND MOLDS) AND R. D. WOOD GATE VALVES

FORD YOKES

Introduced in 1911, developed and perfected for thirty years, Ford Yokes are now used in many hundreds of water works and almost half a million are in service.



Before the FORD YOKE there was no yoke for water meters. In pioneering this development it was Edwin H. Ford's firm conviction that every meter deserved more consideration than to be installed in a service like any fitting or piece of pipe.

Now, with the trend more strongly than ever toward greater accuracy and more frequent testing, the easy and trouble-free accessibility of a water meter set in a Ford Yoke makes this proven and perfected setting device even more worth while.

It will pay any water works to investigate and consider carefully the many advantages Ford Yokes have to offer. Full information and free samples are available.

Ask for our catalog and learn about better ways of setting water meters.

FORD METER BOX CO., WABASH, IND.

and guarantees established for various pneumatic equipment, such as rock drills, reciprocating compressors and vacuum pumps, centrifugal compressors, rock drills, compressor accessories, and machinery for compressing gases other than air.

Test standards are next given. A detailed discussion of the installation and care of compressors and general facts about the lubrication of compressors and compressed air equipment follow. A series of valuable tables and charts showing the cost of compressing air, the nature and cost of air pressure loss, the effect of altitude on compressor capacity, brake horsepower required by air compressors, and other related data, conclude the first part.

Part two of the publication is divided into seven sections, describing in turn—reciprocating compressors and vacuum pumps, stationary type; rotary compressors and vacuum pumps; centrifugal compressors and exhausters; compressor accessories; portable compressors; rock drills and accessories; pneumatic tools and accessories. All pertinent facts including types, sizes, and rating standards, are given.

"Trade Standards," which costs one dollar plus postage, can be obtained from the Compressed Air Institute, 90 West Street, New York City.

The Process of "Metallizing" being used by many essential industries to avoid replacements and increase service-life of machinery now difficult to replace, is described in Bulletin 42A, just published by the Metallizing Engineering Co. The 16-page bulletin gives complete information about the metal coating process and the equipment used in it. Worn diameters or canoded surfaces are built up by hand-gun spraying with corrosion-resistant metal. "Metallizing" is also used to salvage defective castings and mismachined parts. Examples are given in the bulletin to show how metallized inserts and coatings are helping conserve vital metals. For a copy, write to Metallizing Engineering Co., Inc., 21-07 41st Ave., Long Island City, New York.

BUY DEFENSE BONDS AND SAVINGS STAMPS

The Largest Digester Installation is a P. F. T.

It's at Cleveland, Ohio, and it's P.F.T. Equipment, of course. Twelve 95' diameter hexagonal covers serve Cleveland's Easterly Plant (six others serve the Westerly Plant). It is one of many installations shown in Bulletin No. 132.

How sewage gas is utilized to heat water for the digester tank coils, thus hastening the digestion processes, and other design and operating features are detailed. May we send a copy?

P.F.T. PACIFIC FLUSH-TANK COMPANY
4241 Ravenswood Ave., Chicago
New York Charlotte, N. C.

HYDRO-TITE

A DEPENDABLE self-caulking joint compound used to joint cast iron bell and spigot pipe. Much easier to use than lead and makes stronger, more flexible and tighter joints.

Employed on thousands of miles of pipe from 4" to 60". Write for our free trial offer.

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MAIN SALES OFFICE - 50 CHURCH STREET, NEW YORK
GENERAL OFFICES AND WORKS - WEST MEDFORD STATION, BOSTON, MASS.
OVER 25 YEARS WITHOUT A FAILURE

As In '17—

IT'S LAYNE WATER SYSTEMS FOR THE ARMY, NAVY & WAR NEEDS

Built under extreme emergency and with amazing speed, thousands of Layne Wells and Pumps are providing billions of gallons of water for war needs—Army Camps, Flying Fields, Naval Stations, Ordnance Works, Chemical Plants, Munition Plants and numerous fortified outposts. Though built with utmost speed, those Layne Water Systems have the strength and ruggedness which will last for years and years.

Layne Well Water Systems, regardless of when, where or how speedily built, are the finest that can be constructed. They will faithfully fulfill their mission until victory comes, whether this year, next year or years from now.

Those men of the Army, Navy and Marine Corps who some day will return to civilian life may well remember that it was Layne who built the well water systems which helped to win the war.

In the meantime, essential civilian water supply service continues. The Layne organization is fulfilling its pledge of "Keep Them Flowing!"

LAYNE & BOWLER, INC.
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Layne-Western Co. of Minn.....Minneapolis, Minn.
Layne-Bowler New England Corp...Boston, Mass.
International Water Supply, Ltd...London, Ont.

WORLD'S LARGEST WATER DEVELOPERS

EQUIPMENT NEWS

%Proportioneers% Offering Mobile Treatment Units in Two Sizes

"Blitz-Buggy" No. 1

● %Proportioneers% Inc. of Providence, R. I., are featuring what they term "Blitz-Buggys," in two sizes, for field or emergency use in disinfection, fire-fighting, and decontamination or other chemical treatment in general.

The smaller of the two units is here pictured. It is equipped with a V8.-85 H.P. engine direct connected to a centrifugal pump of 400 g.p.m. delivery capacity against pressure of 120 lbs. or 200 g.p.m. against 200 lbs. pressure. The very flexible Hi-Capacity Chem-O-Feeder for hypochlorite solution (or other chemicals), has a chlorine delivery capacity up to 200 lbs. per 24 hrs. and downwards to a fraction of a pound per day. Storage racks provide for 1 case of nine 5-lb. cans of high-test hypochlorite and bottles of hypochlorite solution in addition. The hypochlorite solution is prepared in 3 collapsible rubberized solution bags hung immediately beneath the chemical storage rack.

The larger "Blitz-Buggy" is equipped with additional feeders. The interesting feature is that these additional units may be used in place, or may be removed readily for leaving at desirable points, while the "Buggy" goes on to serve at another point of need. The quickly demountable units are self contained with both motor and gas-engine drive. One feeder is meter operated to provide proportional feed where desired.

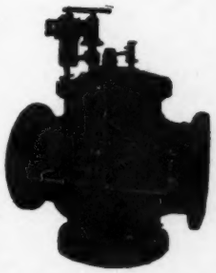
For further information, complete drawings and specifications, on the two useful emergency and general field service units, write %Proportioneers% Inc., 9 Codding St., Providence, R. I.

BUY DEFENSE BONDS AND SAVINGS STAMPS

·1879·
ROSS
·AUTOMATIC VALVES

ALTITUDE VALVES
for
Control of elevation and heads into and out of tanks, basins and reservoirs.
1. Single acting.
2. Double acting.
3. Combination assembly for three or more automatic operations.

COMBINATION VALVE
Combination automatic control both directions through the valve.
A self-contained unit, with three or more automatic controls.



REMOTE CONTROL VALVE
Electric remote control—solenoid or motor can be furnished.
Adapted for use as primary or secondary control on any of the hydraulically controlled or operated valves.

ROSS VALVE MFG. CO.
INCORPORATED
P. O. BOX 595, TROY, N. Y.

OMEGA BELT TYPE GRAVIMETRIC FEEDER

Weighs the material as it is fed on a short section of conveyor belt which is mounted on accurate scales. These feeders may be connected directly to large overhead storage bins if desired.

Accurate feeding range is from 5 lbs. to 3,000 lbs. per hour. A totalizer shows the number of pounds of material that have passed through the feeder.

The last word in Chemical Feeders

OMEGA MACHINE CO.

4010 Penn Ave., Kansas City, Mo.

Reilly Defense Paints and Coatings Now Supplemented by Incendiary Smothering Pitch

● It is recognized that a *fully* effective blackout requires protection against reflected outside light, as well as complete stoppage of inside light. Reilly blackout paints are offered as a practical solution to this problem. A single coat of Reilly No. 5 paint, applied by brush to the outside surface of windows and skylights, gives a heavy, opaque, waterproof surface that effectively blacks out all inside light and simultaneously prevents reflection of outside light. This paint adheres firmly to the smooth glass surface, yet may easily be removed when desired.

For metal roofs and outside metal structures such as tanks, towers, stacks, etc., a single coat of Reilly No. 40 paint stops light reflection and makes such surfaces inconspicuous, also gives effective protection against rust. This paint, developed especially for outside service, is extremely resistant to moisture and corrosive vapors, and withstands wide temperature ranges.

For protection against shattered glass, Reilly engineers recommend the use of panels made of plywood or other prepared board, painted with Reilly No. 5. These panels may be quickly installed and removed.

Another Reilly product—hard coal tar pitch—has proved an effective extinguishing agent for magnesium fires and for magnesium incendiary bombs. In fighting fires of this type the application of water, carbon tetrachloride, carbon dioxide, foam and other common extinguishing agents generally speeds up the rate of burning rather than stopping the fire. A highly satisfactory method for extinguishing magnesium fires has recently been developed at the Central Experimental Station of the Bureau of Mines, U. S. Department of the Interior, at Pittsburgh, Pa. The extinguishing agent used is a very hard coal tar pitch (approximately 300° F. softening point). When spread over a hot magnesium fire the pitch softens and seals the burning magnesium metal with an airtight blanket, smothering the flames. Reilly officials advise that shipment of the type of pitch recommended for the fighting of magnesium fires is available through 17 plants located in the principal industrial sections of the country.

Reilly Tar & Chemical Corporation, one of the country's largest producers of coal tar products, has its executive offices and research laboratories in Indianapolis.

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AND SAVINGS STAMPS

ECONOMICAL

Many users tell us of savings made by using Ferri-floc to condition sludge—resulting in

1—Lower chemical costs

2—Simpler operation

3—Higher plant food value of sludge

Write for free samples and literature today!

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ATLANTA, GA. LOCKLAND, OHIO

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on all Problems of
WATER TREATMENT

Whether your problem of water rectification is large or small, we have a form of equipment to serve your needs. We manufacture and install equipment for Gravity Filtration and Softening Plants; Pressure Filters and Zeolite Softeners; Swimming Pool Recirculating Appliances; and Water Treatment Units of all types.

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ELEVATED STEEL TANKS

Our engineering cooperation in the preliminary studies of your needs, and complete construction estimates, will gladly be furnished on request—without obligation. Write for detailed, descriptive Bulletin No. 101.

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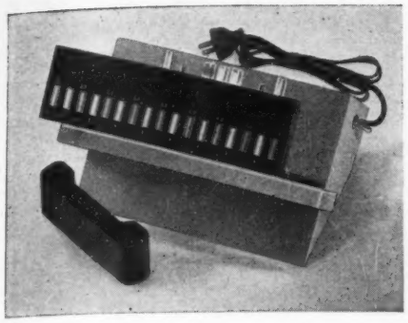
Midget Dalite Lamp



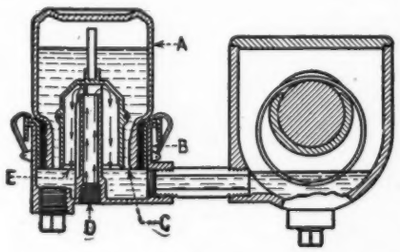
• Although the new Taylor Midget Dalite Lamp was designed for use with single Taylor Slide Comparators, when determinations must be made at night or in dark places, it has been found to be ideal for all routine testing, even in daylight. Also, in many laboratories and plants, it is almost impossible to obtain a clear daylight background because of walls, trees, etc.

The Comparator base sits on the shelf at an angle of 45° so that, in making readings, one can look directly into the slots in the slide and base. This eliminates handling the standards outfit, with attendant chance of breakage. With this new light only the sample tubes need be handled.

The lamp gives uniform dalite conditions at all times. It is fitted with a Dalite glass, special bulb, cord and switch. It operates on any 110 V circuit, and can be used with any of the pH, Chlorine or Phosphate Comparators manufactured by W. A. Taylor & Co., long specialists in pH and other colorimetric control equipment, located at 7300 York Road, Baltimore, Md.

Constant Level Lubricator Prevents Oil Waste, Insures Lubrication

• Of timely importance for the protection of today's vital machinery is this new Oil-Rite Constant Level Lubricator. It holds a visible reserve supply of oil—releases automatically just as much as is needed to maintain a constant predetermined level of lubricant. Its use is said to (1) insure adequate lubrication at all times and (2) prevent oil waste, and the deterioration or spoilage of material caused by oil throw.



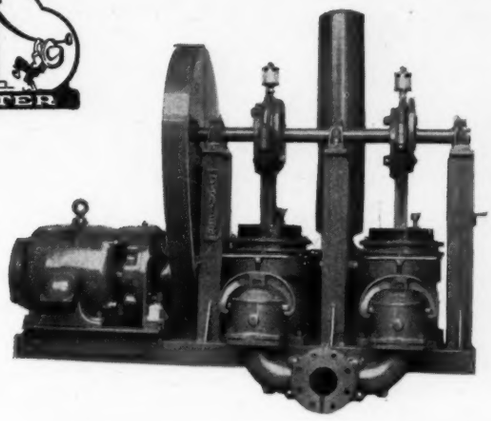
This new Oil-Rite Constant Level Lubricator is used on electric motors, pumps, ventilating fans, gear boxes, or wherever bearings and other machinery

• AERATORS • SIPHONS • WATER SYSTEMS •

SLUDGE PUMPS • FLOCERS • CONDITIONERS • MIXERS

SELF PRIMING CENTRIFUGAL PUMPS • ROWINGER PUMPS

CARTER



SLUDGE PUMPS

FOR SEWAGE, WATER AND INDUSTRIAL WASTE

With over 40 years' experience in specialized pumping equipment, the CARTER plunger sludge pump, as manufactured today, embodies tried and proven construction features pioneered by us. Hundreds of installations in the United States and foreign nations are a testimony to their ability.

RALPH B. CARTER COMPANY

NEW YORK OFFICE
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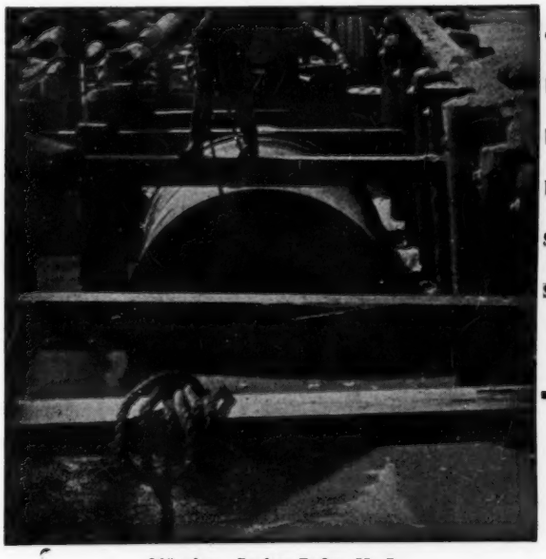

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parts must be provided with an ample supply of lubrication.

Construction of the Oil-Rite Lubricator consists of only three simple parts. When the glass reservoir—(A) in the accompanying diagram—is filled and inverted into position on the base (B), the lower edge (E) of the inverted bucket or bell determines the oil level which the lubricator will maintain. When the level falls below this point, air from the vent (D) escapes under the side of the bell—as at (C)—up to the top of the lubricator, permitting oil to flow down until the level to be maintained again seals across the base of the bell. Operation is entirely automatic—employs no moving parts of any kind. The lubricator comes in four sizes, with capacities of 2, 4, 8 and 16 ozs.

Complete details for all applications will be furnished by the manufacturer, Oil Rite Corporation, 3466 S. 13th Street, Milwaukee, Wisconsin.

Automatic Blackout Switches

• Photoswitch Inc. of Cambridge, Mass., is offering an Automatic Blackout Switch for private properties. The basic principle of its operation is that of the "electric-eye." Located where a street light strikes the switch, as long as the light burns the switch is "on" and when the light is cut off, such as would be the case in a simulated or real emergency, the switch goes "off" to cut out any illuminating system on which it is located.

The new switch operates on a 115 volt A.C. circuit and has the approval of blackout authorities in many of the larger cities, as well as the leading fire insurance laboratories.

For further details, write Photoswitch Inc., 21 Chestnut St., Cambridge, Mass.

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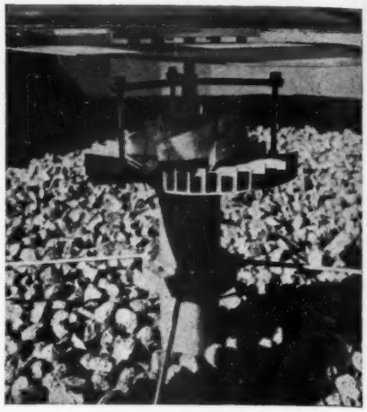

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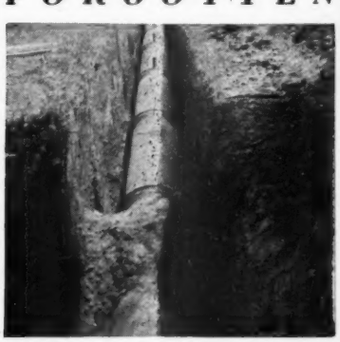

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No Caulking

WITH THE MANUFACTURERS

George Cooper Made Exec. Vice-President of Diamond Alkali

Geo. S. Cooper

At the meeting of the Board of Directors of the Diamond Alkali Co., held May 4, 1942, Mr. George S. Cooper was elected the Executive Vice-President.

Mr. Cooper has been interested in the sale of Diamond products either with the Sales Department of the Company or with one of its affiliates since 1919.

For the past five years he has been Vice President in Charge of Sales with his office in Pittsburgh, where he will continue in his new position.

Arthur A. Batts New Carborundum President

Arthur A. Batts

Arthur A. Batts, formerly Secretary, has been elected President of the Carborundum Co., succeeding Dr. Frank J. Tone who has been elected Chairman of the Board.

Dr. Tone, whose connection with Carborundum dates back to 1895, will continue to be actively interested in the affairs of the company in an advisory capacity. Dr. Tone's achievements in the field of electro-chemistry and metallurgy have brought to him many honors and medals, including the Perkins medal of the Society of Chemical Industry.

Charles Knupfer, former Vice-President in Charge of Sales has been elected Senior Vice-President but will continue to head the Sales Department.

Henry P. Kirchner was made Executive Vice-President in Charge of Operations and elected to the Board.

F. J. Tone, Jr., and Edw. R. Newcomb were also elected Vice-Presidents.

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To honor employees who have entered the service of their country, an Honor Roll is posted in a novel and attractive manner by Gardner-Denver on a Victory "V."

As additional employees enter the service, their names are entered on cards that are then slipped into place on the "V." The flag and the "V" are floodlighted to achieve increased impressiveness.

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Valves may be arranged to open at abnormal pressures and held open under subnormal pressures until the surge subsides, and then close when normal conditions prevail.

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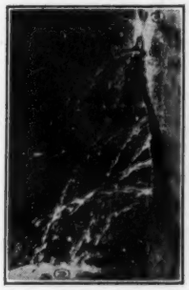

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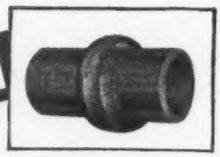

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1500 W. & T. Employees Donate One Hour Overtime Work to Navy Relief

● A novel plan of painless giving by industrial employees has been developed in the New Jersey Navy Relief campaign, it was revealed this week when the workers and the management of Wallace & Tiernan Co., Inc., shared in the contribution of $6,500 to the Naval Relief Society.

Devised as a means to permit every employee to contribute without burdening the family budget, this plan is thought to be original with Wallace & Tiernan Industries. During the week, each of the 1,500 employees gave one hour of overtime work. The value of this work was calculated in terms of finished products and a sum representing an additional contribution of the Company was added. The program served a two-fold purpose, because the finished products represent additional output of equipment vitally essential to the war effort.

In the accompanying picture "Mike" Tiernan, President of Wallace and Tiernan, is presenting the $6,500 check to Captain Reynolds Hayden, Medical Officer of the Third Naval District, while Miss Bertha Lindsay and John Walker, representing W. & T. workers, look on. Captain Hayden was in command of the base hospital at Pearl Harbor on that fateful December 7th, as the Japs will learn all too well before another Dec. 7th arrives.

["W. & T." has since been awarded a Navy "Certificate of Honor" by the Secretary of the Navy.—Ed.]

R. W. Miller Made Technical Service Manager by Columbia Alkali

● R. W. Miller, has recently been appointed manager of the Department of Technical Service in the Columbia Chemical Div. of Pittsburgh Plate Glass Co.

Twelve years ago (1930) Mr. Miller joined Columbia Alkali after receiving the degree of B. S. in Chemistry from Penna. State College. Since 1937 he has been engaged in technical service activities in connection with applications of Columbia alkalies and liquid chlorine. He now succeeds Dr. G. L. Cunningham (resigned) as head of Technical Service.

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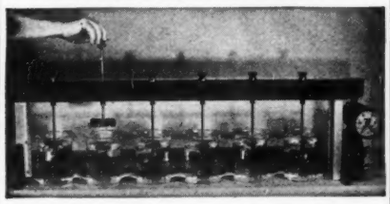
LABORATORY MIXER . . .



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Dean McCrory Moved Up Penn. Salt's Ladder

Dean E. McCrory

Smiling Dean E. McCrory, popular sales representative in the Pittsburgh territory of the Pennsylvania Salt Manufacturing Co. since 1936, has been transferred to the Company's executive offices in Philadelphia. In his new position he will be concerned with the sales of a number of important Penn-Salt products.

Mr. McCrory completed his undergraduate work in Franklin and Marshall College and, thereafter, took graduate work in sanitary engineering at Carnegie Tech. In his territory Dean made many friends for himself and his Company, who will be happy to learn of his recent boost up Penn-Salt's ladder of attainment recognition.

Gregg Co. Handling New England Territory for Rusta Restor

● A. Pierce Gregg, President of The Gregg Co. of Philadelphia has announced that since the transfer of Mr. Ralph Thompson from the New England territory to the Los Angeles office of Rusta Restor Corp., of Freemont, Ohio, The Gregg Co. will sell and service "Rusta Restor" equipment for cathodic protection of steel water tanks, stand-pipes and under water iron and steel structures generally.

Until such time as a permanent representative is appointed to replace Mr. Thompson in the New England territory The Gregg Co. will continue to act as sales and service representatives.

P. S. Wilson, formerly Operative Engineer with Community Water Service Co., is in charge of the Rusta Restor Division of The Gregg Co., 1418 Walnut St., Philadelphia, and is now at the service of New Englanders as well as others in the Company's Eastern territory.

Manhattan Rubber Tells How to Make Rubber Hose Last Longer

● In the interest of rubber conservation, two useful wall cards on the proper care of hose have been prepared by The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Ins., are now ready for gratis distribution.

One of the cards is devoted to the proper care of fire hose, and the other lists rules for the proper care of air, water, steam and other types of rubber hose and for proper attaching of couplings. Both cards are 8¾" x 11" and have an eyelet for convenient hanging. Either or both may be obtained on request addressed to The Manhattan Rubber Mfg. Div., Raybestos-Manhattan, Inc., Passaic, N. J.

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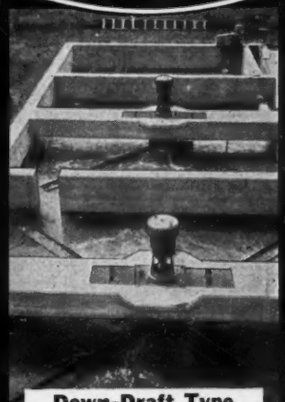

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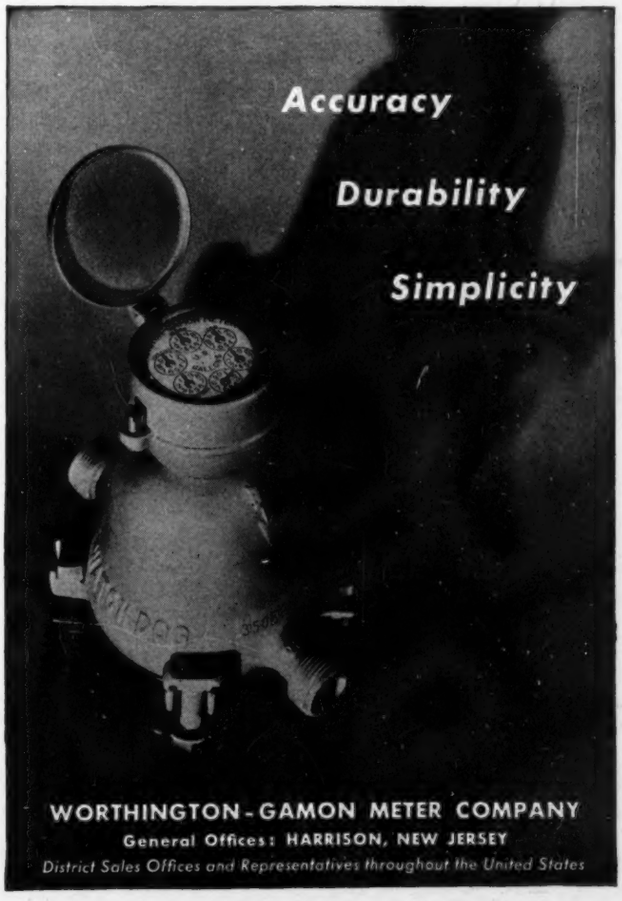

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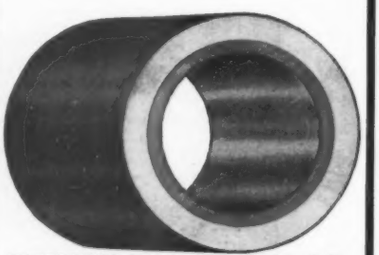

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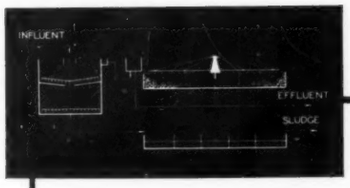
MORE HOURS IN THE AIR

Typical "air force" type sewage treatment plant. At left, Dorr Clarigester; center, trickling filter with Dorrco Distributor; in rear, sludge drying beds. Flowsheet below.

THROUGH BETTER AIR FIELD SANITATION



DORR EQUIPMENT FOR WAR PLANTS

Air Fields and Ordnance Plants
Design Population—5000.
Type Treatment—Trickling Filter.
Dorr Equipment—Clarigester, Distributor, Secondary Clarifier.

Army Camps and Naval Bases
Design Population—5000—65,000.
Type Treatment—Biofiltration (single or two-stage).
Dorr Equipment—Detritors, Clarifiers, Distributors, Multidigestion Systems.

★ We have got to keep them healthy to keep them flying. Hours on the sick list do not add up in the experience records of our Air Force Cadets.

So in this war, as in no other in history, our fliers and other Fighting Forces are being protected adequately against the time consuming inroads of water borne contagion.

The plant above is typical of the many we are now equipping for Air Force units of up to 5000—for civilian war workers, too, at small and medium size arsenals, explosive factories and armament works. In this "air force" type of plant, two Dorr units, a Clarigester and a Distributor, provide complete treatment—primary sedimentation, trickling filters and sludge digestion.

We have prepared accurate designs and specifications for the military type plants listed at the left, providing all types of sewage treatment for groups of 1000 to 50,000 men. These are available to authorized procurement officers, engineers and contractors.

May we talk facts and figures on sanitary engineering from the military standpoint?

DORRCO

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ADDRESS ALL INQUIRIES TO OUR NEAREST OFFICE

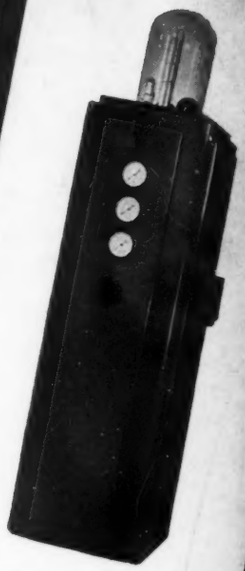
AT CHICAGO

A.W.W.A. Conference on

artime Water Works Problems

JUNE 21-25

New W&T Portable Chlorinator provides for compensated solution feed. Valuable for main sterilization and emergency service.



The W&T "Visible Vacuum" Chlorinators have long-term service value in war and peace.

W&T Chlorination Trailer gives self-powered protection in case of broken mains and emergencies.

W&T Hypochlorinators safeguard small water supplies, stand-by sources, and other special safety needs.

SEE HOW W&T Equipment fits your plans for WARTIME WATER SAFETY

For small water supplies or large . . . for coastal or inland cities . . . for regular or emergency protection . . . Wallace & Tiernan chlorine control equipment fits into your wartime plans for extra safety. At Chicago, new units designed specifically to meet today's conditions will be on display, such as the W&T Chlorination Trailer and New Portable Chlorinator with compensated feed.

W&T men with wide practical experience on wartime water problems will be on hand. They will tell you what other cities and towns with problems comparable to yours, are doing . . . will advise on making the best use of present equipment . . . or will suggest how to supplement present methods for positive protection right to the user's tap.

With W&T aid, your plans for emergency protection in case of broken mains and other war destruction can be based on actual experience in England and other "blitzed" areas.

And . . . if you *can't* come to Chicago . . . you'll have more reason than ever to get in touch with your W&T representative after the conference for up-to-the-minute safety service.

SA-133

PRIORITIES

A representative of our Priorities Department will be on hand at the Conference to answer your questions on priorities.

WALLACE & TIERNAN CO., INC.